

STIC Search Report

EIC 2800

STIC Database Tracking Number 143378

TO: Victor Mandala
AU 2826
Location: JEF-4C29
2/10/2005
10/020,004

From: Jeff Harrison
Location: STIC-EIC2800
JEF-4B68
Phone: 22511

Email: harrison, jeff

Search Notes

Re: An individual-semiconductor-nanowire as a bio/chem sensor

Attached are edited results from Chemical Abstracts and nonpatent literature. See especially the asterisk-tagged items at the top of the results – some of these talk about individual semiconductor/carbon nanotube/nanowire as a chem or bio sensor.

All attached results have either a pre-2001 publication date or a pre-2001 priority date. *2000 and older*

If you have questions or comments or would like further searching, let me know.

Respectfully,
Jeff

Jeff Harrison
Team Leader, STIC-EIC2800
JEF-4B68, 571-272-2511

143378

SEARCH REQUEST FORM Scientific and Technical Information Center - EIC2800
 Rev. 3/15/2004 This is an experimental format -- Please give suggestions or comments to Jeff Harrison, JEF-4B68, 272-2511.

Date 1-25-05 Serial # 10/020,004 Priority Application Date 12-11-00
 Your Name Victor MANDALA Examiner # 79234
 AU 2826 Phone X1918 Room 4C29
 In what format would you like your results? Paper is the default. (PAPER) DISK EMAIL

If submitting more than one search, please prioritize in order of need.

The EIC searcher normally will contact you before beginning a prior art search. If you would like to sit with a searcher for an interactive search, please notify one of the searchers.

Where have you searched so far on this case?

Circle: USPT DWPI EPO Abs JPO Abs IBM TDB

Other: East word search on all available data bases

What relevant art have you found so far? Please attach pertinent citations or Information Disclosure Statements.

What types of references would you like? Please checkmark:

Primary Refs ☒ Nonpatent Literature ☒ Other _____
 Secondary Refs ☒ Foreign Patents ☒ _____
 Teaching Refs _____

What is the topic, such as the **novelty**, motivation, utility, or other specific facets defining the desired **focus** of this search? Please include the concepts, synonyms, keywords, acronyms, registry numbers, definitions, structures, strategies, and anything else that helps to describe the topic. Please attach a copy of the abstract and pertinent claims.

Semiconductor (nanowire^{or} nanotube) & sensor

Additional detail:

Sensor → senses chemical or biological reaction entity

Look at claims 1 & 2

A sheet is attached listing all analytes.

Staff Use Only

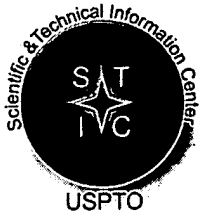
Searcher: HARRISON
 Searcher Phone: 22511
 Searcher Location: STIC-EIC2800, JEF-4B68
 Date Searcher Picked Up: 2-10-05
 Date Completed: 2-10-05
 Searcher Prep/Rev Time: 90
 Online Time: 90

Type of Search

Structure (#) _____
 Bibliographic ☒
 Litigation _____
 Fulltext _____
 Patent Family _____
 Other _____

Vendors

STN ☒
 Dialog ☒
 Questel/Orbit _____
 Lexis-Nexis _____
 WWW/Internet _____
 Other _____



STIC Search Results Feedback Form

3

EIC 2800

Questions about the scope or the results of the search? Contact *the EIC searcher or contact:*

Jeff Harrison, EIC 2800 Team Leader
571-272-2511, JEF 4B68

Voluntary Results Feedback Form

➤ I am an examiner in Workgroup: Example: 2810

➤ Relevant prior art **found**, search results used as follows:

- ☐ 102 rejection
- ☐ 103 rejection
- ☐ Cited as being of interest.
- ☐ Helped examiner better understand the invention.
- ☐ Helped examiner better understand the state of the art in their technology.

Types of relevant prior art found:

- ☐ Foreign Patent(s)
- ☐ Non-Patent Literature
(journal articles, conference proceedings, new product announcements etc.)

➤ Relevant prior art **not found**:

- ☐ Results verified the lack of relevant prior art (helped determine patentability).
- ☐ Results were not useful in determining patentability or understanding the invention.

Comments:

Drop off or send completed forms to STIC/EIC2800, CP4-9C18



10feb05 15:45:12 User259284 Session D3065.2

File 305:Analytical Abstracts 1980-2005/Feb W1
(c) 2005 Royal Soc Chemistry

Set	Items	Description
S1	21	SEMICOND????????(3N)NANO????????

10feb05 15:46:28 User259284 Session D3065.3

File 5:Biosis Previews(R) 1969-2005/Feb W1
(c) 2005 BIOSIS

Set	Items	Description
S1	94	SEMICOND????????(3N)NANO????????
S2	10	S1 AND (NT OR NTS OR SWNT? ? OR DWNT? ? OR NANOTUB? OR NAN- OFIB? OR NANOWIR? OR NANO(2N) (TUBE?? OR WIRE?? OR WIRING?? OR FIBR???? OR FIBER???)

10feb05 15:49:12 User259284 Session D3065.4

File 94:JICST-EPlus 1985-2005/Dec W4
(c)2005 Japan Science and Tech Corp(JST)

Set	Items	Description
S1	452	SEMICOND????????(3N)NANO????????
S2	63	S1 AND (NT OR NTS OR SWNT? ? OR DWNT? ? OR NANOTUB? OR NAN- OFIB? OR NANOWIR? OR NANO(2N) (TUBE?? OR WIRE?? OR WIRING?? OR FIBR???? OR FIBER???)
S3	48	S2/2001-2005
S4	15	S2 NOT S3
S5	0	S1 AND NANOSENS?
S6	0	S1 AND NANOBIOSSENS?
S7	2	S1 AND BIOSSENS?
S8	0	S1 AND BIODTECT?
S9	20	S1 AND DETECT????
S10	9	S1 AND SENS????
S11	27	S5:S10
S12	19	S11/2001-2005
S13	8	S11 NOT S12

CAS/STN FILE 'HCAPLUS' ENTERED AT 13:34:27 ON 10 FEB 2005

L1 10528 S RICE/CS, PA AND HOUSTON/CS, PA

FILE 'HCAPLUS' ENTERED AT 13:35:09 ON 10 FEB 2005

L2 224 S RICE/CS, PA AND (NANOTUB? OR NANOWIR? OR NANOSENS? OR NANODETECT? OR NANOBIOS#####)
 L3 10559 S (L1 OR L2)
 L4 381 S L3 AND 1996/PY
 L5 1739 S L3 AND 1996-2000/PY
 L6 54 S L2 AND 1996-2000/PY
 L7 39570 S (SENSORS/CT OR BIOSENSORS/CT)
 L8 1692 S ("CLINICAL ANALYZERS"/CT OR "SURFACE PLASMON RESONANCE"/CT)
 L9 1692 S ("CLINICAL ANALYZERS"/CT OR "SURFACE PLASMON RESONANCE"/CT)
 L10 22048 S (BIOSENS? OR BIODETECT? OR NANOBIOSENS? OR NANOBIODETECT? OR BIONANO? OR NANOBIOS? OR NANOCHEM?)
 L11 0 S L6 AND (L7 OR L8 OR L9 OR L10)
 L12 17 S RICE/CS, PA AND (L7 OR L8 OR L9 OR L10 OR L11)
 L13 1 S L12 AND 1990-2000/PY
 L14 40 S NANOBIOSENS?
 L15 35 S L14 AND 2001-2005/PY
 L16 2 S L14 AND 2001-2005/PRY
 L17 0 S L14 AND 1990-2000/PRY
 L18 5 S L14 NOT L15
 L19 5 S L18 NOT L16
 L20 0 S BIONANOW?
 L21 38 S BIONANOT?
 L22 0 S L21 AND 1990-2000/PY
 L23 0 S L21 AND 1990-2000/PRY
 L24 5847 S NANOWIR?
 L25 4809 S L24 AND 2001-2005/PY
 L26 56 S L24 AND 1990-2000/PRY
 L27 1038 S L24 NOT L25
 L28 0 S L24 AND 1980-1989/PRY
 L29 1085 S L26 OR L27
 L30 62 S L29 AND ?SENS?
 L31 30 S L29 AND ?DETECT?
 L32 82 S (L30 OR L31)
 L33 1 S L29 AND ?TRANSDUC?
 L34 0 S L29 AND BIOPROB?
 L35 0 S L29 AND (BIOCHEM##### OR BIO OR BIOLOG##### OR BIOMED##### OR CHEMO OR CHEMIC#####) (2A) PROB###
 L36 21063 S BIOSENSOR
 L37 148 S BIO SENSOR
 L38 202 S BIO SENS###
 L39 13508 S CHEMOSENS? OR CHEM##### (2A) ?DETECT?
 L40 24688 S CHEMOSENS? OR CHEM##### (2A) ?SENS?
 L41 17818 S CHEMOSENS? OR CHEM##### (2A) PROB###
 L42 31150 S (NANOWIR##### OR NANO##### (2A) (WIR#### OR ROD OR TUBE####) OR NANOTUB? OR NANOROD? OR SWNT OR DWNT OR NTS OR (SEMICOND##### OR "C" OR CARBON#####) (2A) NT)
 L43 62889 S (L36 OR L37 OR L38 OR L39 OR L40 OR L41)
 L44 471 S L43 AND L42
 L45 461 S L44 NOT L32
 L46 410 S L45 AND 2001-2005/PY
 L47 19 S L45 AND 1985-2000/PRY
 L48 51 S L45 NOT L46
 L49 68 S L47 OR L48
 L50 88 S L13 OR L19 OR L32
 L51 68 S L49 NOT L50
 L52 3 S L16 OR L33
 L53 2 S L52 NOT L50
 L54 2 S L53 AND 2001-2005/PY
 L55 0 S L53 AND 1990-2000/PRY
 L56 4 S LIEBER C?/AU, IN AND L51
 L57 64 S L51 NOT L56
 L58 10 S SEMICOND##### AND L57
 L59 3362 S ("SEMICONDUCTOR SENSORS"/CT OR "SEMICONDUCTOR DEVICES (L) GAS DETECTORS"/CT OR "SEMICONDUCTOR DEVICES (L) GAS SENSORS"/CT OR "SEMICONDUCTOR GAS SENSORS"/CT)
 L60 13779 S BIOSENSORS/CT
 L61 54 S L57 NOT L58
 L62 14 S L61 AND (L59 OR L60)
 L63 40 S L61 NOT L62
 L64 5 S L63 AND (NANOSENS? OR NANODETECT? OR BIOSENS? OR BIODETECT? OR SENS#### OR DETECT#####)/TI
 L65 35 S L63 NOT L64

HCAPLUS COPYRIGHT 2ACS on STN

AN 2000:516335 HCAPLUS Full-text

DN 133:230866

ED Entered STN: 31 Jul 2000

TI Chemical control of nanotube electronics

AU Peng, Shu; Cho, Kyeongjae

CS Division of Mechanics and Computation, Stanford University, Stanford, CA,
94305, USA

SO Nanotechnology (2000), 11(2), 57-60

CODEN: NNOTER; ISSN: 0957-4484

PB Institute of Physics Publishing

DT Journal

LA English

CC 76-2 (Electric Phenomena)

AB The possibility of modifying the electronic properties of nanotubes using gas mol. adsorption is investigated using the first-principles total energy d. functional calcns. Detailed anal. of the electronic structures and energetics is performed for the **semiconducting (10,0) single-walled carbon nanotube interacting with several representative gas mols.** (NO₂, NH₃, CO, O₂, and H₂O). The results elucidate the mechanisms of the adsorption-induced nanotube doping and illustrate an example of the simulation-based design characterization of nanoelectronic components.

ST chem control carbon nanotube electronics

IT Nanotubes

RL: PRP (Properties)

(carbon; chemical control of nanotube electronics)

IT Electronic properties

(chemical control of nanotube electronics)

RE.CNT 15 THERE ARE 15 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE.

- (1) Charlier, J; Appl Phys A 1998, V67, P79
- (2) Chico, L; Phys Rev Lett 1996, V76, P971 HCAPLUS
- (3) Cornwell, C; Chem Phys 1998, V109, P763 HCAPLUS
- (4) Dresselhaus, M; Science of Fullerenes and Carbon Nanotubes 1996
- (5) Falvo, M; Nature 1997, V389, P582 MEDLINE
- (6) Iijima, S; J Chem Phys 1996, V104, P2089 HCAPLUS
- (7) Kong, J; Science 2000, V287, P622 HCAPLUS
- (8) Mickelson, E; Chem Phys Lett 1998, V296, P188 HCAPLUS
- (9) Payne, M; Rev Mod Phys 1992, V64, P1045 HCAPLUS
- (10) Rose, J; Phys Rev B 1984, V29, P2963 HCAPLUS
- (11) Service, R; Science 1999, V285, P2053 HCAPLUS
- (12) Srivastava, D; Phys Rev Lett 1999, V83, P2973 HCAPLUS
- (13) Treacy, M; Nature 1996, V381, P678 HCAPLUS
- (14) Wong, E; Science 1997, V277, P1971 HCAPLUS
- (15) Yao, Z; Nature 1999, V402, P273 HCAPLUS

L58 ANSWER 8 OF 10 HCAPLUS COPYRIGHT ACS on STN

AN 2000:88136 HCAPLUS

DN 132:201560

ED Entered STN: 08 Feb 2000

TI Nanotube molecular wires as chemical sensors

AU Kong, Jing; Franklin, Nathan R.; Zhou, Chongwu; Chapline, Michael G.; Peng, Shu; Cho, Kyeongjae; Dailt, Hongjie

CS Department of Chemistry, Stanford University, Stanford, CA, 94305, USA

SO Science (Washington, D. C.) (2000), 287(5453), 622-625

CODEN: SCIEAS; ISSN: 0036-8075

AB Chemical sensors based on individual single-walled C nanotubes (SWNTs) are demonstrated. Upon exposure to gaseous mols. such as NO₂ or NH₃, the elec. resistance of a semiconducting SWNT dramatically increases or decrease. This serves as the basis for nanotube mol. sensors. The nanotube sensors exhibit a fast response and a substantially higher sensitivity than that of existing solid-state sensors at room temperature. Sensor reversibility is achieved by slow recovery under ambient conditions or by heating to high temps. The interactions between mol. species and SWNTs and the mechanisms of mol. sensing with nanotube mol. wires are studied.

IT Nanotubes

RL: AMX (Analytical matrix); PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); ANST (Analytical study); PROC (Process); USES (Uses)

(carbon; nanotube mol. wires as chemical sensors)

IT Wires

(mol.; nanotube mol. wires as chemical sensors)

IT Electric conductivity

Electric current-potential relationship

Electric resistance

Sensors

(nanotube mol. wires as chemical sensors)

IT 7664-41-7, Ammonia, analysis 10102-44-0, Nitrogen dioxide, analysis

RL: ANT (Analyte); ANST (Analytical study)

(nanotube mol. wires as chemical sensors)

IT 7440-44-0, Carbon, properties

RL: AMX (Analytical matrix); PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); ANST (Analytical study); PROC (Process); USES (Uses)

(nanotube; nanotube mol. wires as chemical sensors)

RE.CNT 27 THERE ARE 27 CITED REFERENCES AVAILABLE FOR THIS RECORD

- (1) Anon; MRS Bull 1999, V24
- (2) Baughman, R; Science 1999, V284, P1340 HCAPLUS
- (3) Capone, S; Langmuir 1999, V15, P1748 HCAPLUS
- (4) Cheng, A; J Chem Phys 1990, V92, P3867 HCAPLUS
- (5) Dai, H; Nature 1996, V384, P147 HCAPLUS
- (6) de Heer, W; Science 1995, V270, P1179 HCAPLUS
- (7) Dresselhaus, M; Science of Fullerenes and Carbon Nanotubes 1996
- (8) Grigorian, L; Phys Rev Lett 1998, V80, P5560 HCAPLUS
- (9) Hair, M; Infrared Spectroscopy in Surface Chemistry 1967
- (10) Heiney, P; J Phys Chem Solids 1992, V53, P1333 HCAPLUS
- (11) Kong, J; Nature 1998, V395, P878 HCAPLUS
- (12) Lee, R; Nature 1997, V388, P255 HCAPLUS
- (13) Longergan, M; Chem Mater 1996, V8, P2298
- (14) Mandelis, A; Physics, Chemistry and Technology of Solid State Gas Sensor Devices 1993
- (15) Martel, R; Appl Phys Lett 1998, V73, P2447 HCAPLUS
- (16) McConnell, H; Science 1992, V257, P1906 HCAPLUS
- (17) Miasik, J; J Chem Soc Faraday Trans 1986, V82(1), P1117
- (18) Peng, S; in preparation
- (19) Rowntree, P; J Chem Phys 1990, V92, P3853 HCAPLUS
- (20) Sberveglieri, G; Sens Actuators 1991, V84, P457
- (21) Shimizu, Y; MRS Bull 1999, V24, P18 HCAPLUS
- (22) Sjoval, P; Chem Phys Lett 1990, V172, P125
- (23) Soh, T; Appl Phys Lett 1999, V75, P627
- (24) Takao, Y; J Electrochem Soc 1994, V141, P1028 HCAPLUS
- (25) Tans, S; Nature 1998, V393, P49 HCAPLUS
- (26) Wong, S; Nature 1998, V394, P52 HCAPLUS
- (27) Zhou, C; in preparation

REPORTS

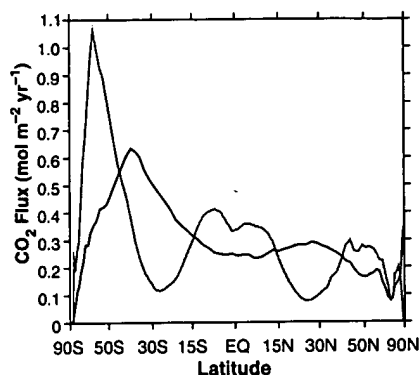


Fig. 3. Zonal mean anthropogenic CO_2 accumulation rate in the ocean (black line) and zonal mean anthropogenic CO_2 flux into the ocean (magenta line), by latitude band (averaged over land and ocean areas for 1995). The latitude axis is scaled so that equal horizontal distances represent equal areas on Earth's surface. On this scale, the total flux or accumulation into the ocean is proportional to the area under the appropriate curve. The Southern Ocean is an area with the highest anthropogenic CO_2 fluxes, but the Antarctic Convergence is the area with the largest anthropogenic CO_2 accumulation.

ern Ocean was much more vigorous in the period from ~1350 to 1880 A.D. than in the recent past. Our simulations reflect primarily late-20th century oceanographic conditions and support the conclusion of a subordinate role for deep convection in the Southern Ocean during this time period (21).

Our conclusion that present-day Southern Ocean uptake of anthropogenic carbon is large, but Southern Ocean storage is relatively small, has implications for the mechanisms governing future changes in the ocean carbon cycle. If most of the anthropogenic carbon entering the Southern Ocean is being transported northward isopycnally to the Antarctic Convergence, then a reduction in deep convection would have little impact on Southern Ocean uptake of anthropogenic carbon. Thus, the particular scenario described in (6) seems unlikely to occur. Changes in ocean circulation, reduction in sea ice coverage, temperature-dependent changes in CO_2 solubility, and changes in biological activity will impact oceanic CO_2 uptake (6, 15). Nevertheless, if global climate change reduces the density of surface waters in the Southern Ocean (6, 15), isopycnal surfaces that are now ventilated would become isolated from the atmosphere; this would tend to diminish Southern Ocean carbon uptake.

References and Notes

- J. L. Sarmiento and E. T. Sundquist, *Nature* **356**, 589 (1992); C. D. Keeling, S. C. Piper, M. Heimann, in *Aspects of Climate Variability in the Pacific and Western Americas*, vol. 55 of *Geophysical Monograph Series*, D. H. Peterson, Ed. (American Geophysical Union, Washington, DC, 1989), pp. 305–363; P. P. Tans, I. Y. Fung, T. Takahashi, *Science* **247**, 1431 (1990).
- C. L. Sabine et al., *Global Biogeochem. Cycles* **13**, 179 (1999).
- E. Maier-Reimer and K. Hasselmann, *Clim. Dyn.* **2**, 63 (1987).
- U. Siegenthaler and J. L. Sarmiento, *Nature* **365**, 119 (1993).
- J. L. Sarmiento, J. C. Orr, U. Siegenthaler, *J. Geophys. Res.* **97**, 3621 (1992); J. L. Sarmiento, C. Le Quere, S. W. Pacala, *Global Biogeochem. Cycles* **9**, 121 (1995).
- J. L. Sarmiento, T. M. C. Hughes, R. J. Stouffer, S. Manabe, *Nature* **393**, 245 (1998).
- N. Gruber, J. L. Sarmiento, T. S. Stocker, *Global Biogeochem. Cycles* **10**, 809 (1996).
- N. Gruber, *Global Biogeochem. Cycles* **12**, 165 (1998).
- A. Poisson and C.-T. Chen, *Deep Sea Res. Part A* **34**, 1255 (1987); P. P. Murphy, R. A. Freely, R. H. Gammon, K. C. Kelly, L. S. Waterman, *Mar. Chem.* **35**, 77 (1991).
- P. B. Duffy and K. Caldeira, *Geophys. Res. Lett.* **24**, 1323 (1997); K. Caldeira and P. B. Duffy, *Geophys. Res. Lett.* **25**, 1003 (1998). Our simulations tend to have slow and shallow North Atlantic Deep Water, but they represent the Southern Ocean relatively well.
- R. Pacanowski, K. Dixon, A. Rosati, *The G.F.D.L. Modular Ocean Model Users Guide version 1.0*, GFDL Ocean Group Technical Report 2 (NOAA/Geophysical Fluid Dynamics Laboratory, Princeton, NJ, 1991).
- J. M. Oberhuber, *J. Phys. Oceanogr.* **23**, 808 (1993).
- P. B. Duffy, M. Eby, A. J. Weaver, *Geophys. Res. Lett.* **26**, 1739 (1999).
- D. G. Martinson, *J. Geophys. Res.* **95**, 11641 (1990). The horizontal sizes of regions of brine-induced convection are very small in comparison to the grid cells in our model. Thus, a first-order representation of this subgrid-scale convection process is to sink rejected salt without mixing other tracers (10, 13).
- F. Joos, G.-K. Plattner, T. F. Stocker, O. Marchal, A. Schmittner, *Science* **284**, 464 (1999); R. J. Matear and A. C. Hirst, *Tellus Ser. B* **51**, 722 (1999).
- R. Wanninkhof, *J. Geophys. Res.* **97**, 7373 (1992).
- S. Levitus and T. P. Boyer, *Temperature*, vol. 4 of *World Ocean Atlas 1994*, NOAA Atlas NESDIS 4 (National Oceanographic Data Center, Silver Spring, MD, 1994).
- K. Bryan, *J. Phys. Oceanogr.* **14**, 666 (1984).
- Evidence of deep penetration of CFCs in the Southern Ocean [A. H. Orsi, G. C. Johnson, J. L. Bullister, *Prog. Oceanogr.* **43**, 55 (1999)] may appear to contradict the conclusions drawn here. However, CFCs equilibrate with the atmosphere much more rapidly than CO_2 does, and the solubility of CFCs is much more sensitive to changes in temperature than the solubility of CO_2 is. These two factors increase the ratio of CFC to anthropogenic CO_2 concentrations in the Southern Ocean.
- W. S. Broecker, S. Sutherland, T.-H. Peng, *Science* **286**, 1132 (1999).
- These conclusions are echoed by a study showing deep convection to play a subordinate role in tracer transport in the North Atlantic [A. J. Watson et al., *Nature* **401**, 902 (1999)].
- We thank N. Gruber, R. M. Key, and C. L. Sabine for their insightful papers and access to the data underlying them. K.C. was supported by the NASA Oceanography Program and the U.S. Department of Energy Center for Research on Ocean Carbon Sequestration. P.B.D. was supported by the Lawrence Livermore National Laboratory Laboratory Directed Research and Development program.

15 July 1999; accepted 2 December 1999

Nanotube Molecular Wires as Chemical Sensors

Jing Kong,^{1*} Nathan R. Franklin,^{1*} Chongwu Zhou,¹ Michael G. Chapline,¹ Shu Peng,² Kyeongjae Cho,² Hongjie Dai^{1†}

Chemical sensors based on individual single-walled carbon nanotubes (SWNTs) are demonstrated. Upon exposure to gaseous molecules such as NO_2 or NH_3 , the electrical resistance of a semiconducting SWNT is found to dramatically increase or decrease. This serves as the basis for nanotube molecular sensors. The nanotube sensors exhibit a fast response and a substantially higher sensitivity than that of existing solid-state sensors at room temperature. Sensor reversibility is achieved by slow recovery under ambient conditions or by heating to high temperatures. The interactions between molecular species and SWNTs and the mechanisms of molecular sensing with nanotube molecular wires are investigated.

Carbon nanotubes are molecular-scale wires with high mechanical stiffness and strength. A SWNT can be metallic, semiconducting, or semimetallic, depending on its chirality (1). Utilization of these properties has led to applications of individual nanotubes or ensembles of nanotubes as scanning probes (2, 3), electron field emission sources (4), actuators

(5), and nanoelectronic devices (6). Here, we report the realization of individual semiconducting-SWNT (S-SWNT)-based chemical sensors capable of detecting small concentrations of toxic gas molecules.

Sensing gas molecules is critical to environmental monitoring, control of chemical processes, space missions, and agricultural and medical applications (7). The detection of NO_2 , for instance, is important to monitoring environmental pollution resulting from combustion or automotive emissions (8). Detection of NH_3 is needed in industrial, medical, and living environments (9). Existing electrical sensor materials include semicon-

¹Department of Chemistry, ²Department of Mechanical Engineering, Stanford University, Stanford, CA 94305, USA.

*These authors contributed equally to this work.

†To whom correspondence should be addressed. E-mail: hdai@chem.stanford.edu

REPORTS

ducting metal oxides (7–9), silicon devices (10, 11), organic materials (12, 13), and carbon black–polymer composites (14). Semiconducting metal oxides have been widely used for NO₂ and NH₃ detection (7–9). These sensors operate at high temperatures (200° to 600°C) in order to achieve enhanced chemical reactivity between molecules and the sensor materials for substantial sensitivity (7). Conducting polymers (12) and organic phthalocyanine semiconductors (12, 13) have also been investigated for NO₂ or NH₃ sensing. The former exhibit limited sensitivity (12), whereas the latter tend to have very high resistivity (sample resistance of >10 gigohms) (13). In this report, we show that the electrical resistance of individual semiconducting SWNTs change by up to three orders of magnitude within several seconds of exposure to NO₂ or NH₃ molecules at room temperature. Miniaturized chemical sensors based on individual SWNTs are thus demonstrated. Furthermore, we combine theoretical calculations with experiments to address the underlying fundamental question regarding how molecular species interact with nanotubes and affect their electrical properties.

Semiconducting SWNTs are chiral (m, n) tubes with $m - n \neq 3 \times \text{integer}$. The band gap E_g of an S-SWNT scales with its diameter d as $E_g \sim 1/d$ ($E_g \propto 0.5$ eV for $d \sim 1.4$ nm) (1). It

was previously found that when two metal contacts were used to connect an S-SWNT, the metal/S-SWNT/metal system exhibits p -type transistor characteristics with several orders of magnitude change in conductance under various gate voltages (6, 15, 16). Our nanotube chemical sensors were based on these S-SWNT transistors, obtained by controlled chemical vapor deposition growth of individual SWNTs from patterned catalyst islands on SiO₂/Si substrates (Fig. 1A) (16, 17). Gas-sensing experiments were carried out by placing an S-SWNT sample in a sealed 500-ml glass flask with electrical feedthrough and flowing diluted NO₂ [2 to 200 parts per million (ppm)] or NH₃ (0.1 to 1%) in Ar or air (flow rate of 700 ml/min) through the flask while monitoring the resistance of the SWNT.

We observed that the conductance of S-SWNT samples can be substantially increased or decreased by exposure to NO₂ or NH₃. A current versus voltage (I - V) curve recorded with an S-SWNT sample after a 10-min exposure to NH₃ showed an ~ 100 -fold conductance depletion (Fig. 1B). Exposure to NO₂ molecules increased the conductance of the SWNT sample by about three orders of magnitude (Fig. 1C) when the SWNT sample was initially depleted by a back-gate voltage (V_g) of +4 V (6, 15, 16). The SWNT is a hole-doped semiconductor, as can be gleaned from the current versus gate voltage (I - V_g) curve shown in Fig. 2 (middle curve), where the conductance of the SWNT is observed to decrease by three orders of magnitude under positive gate voltages (6, 15, 16). The I - V_g curve recorded after the S-SWNT sample was exposed to NH₃ exhibits a shift of -4 V (Fig. 2, left curve). In contrast, the I - V_g curve was shifted by +4 V after NO₂ exposure (Fig. 2, right curve). The low resistance (~ 360 kilohms) of the SWNT under zero gate voltage suggests substantial hole carriers existing in the p -type nanotube at room temperature. Exposure to NH₃ effectively shifts the valence band of the nanotube away from the Fermi level, resulting in hole depletion and reduced conductance. For the

NO₂ case, exposure of the initially depleted sample to NO₂ resulted in the nanotube Fermi level shifting closer to the valence band. This caused enriched hole carriers in the nanotube and enhanced sample conductance. These results show that molecular gating effects are capable of shifting the Fermi level of S-SWNTs and modulating the resistance of the sample by orders of magnitude.

The conductance of the SWNT sample increased sharply by about three orders of magnitude after 200 ppm of NO₂ was introduced (Fig. 3A). We investigated five S-SWNT samples and found that the response times (defined as time duration for resistance change by one order of magnitude) of the samples to 200 ppm of NO₂ were in the range of 2 to 10 s. The sensitivity [defined as the ratio between resistance after (R_{after}) and before (R_{before}) gas exposure] is ~ 100 to 1000. After the NO₂ flow was replaced by pure Ar, the conductance of the SWNT samples was observed to slowly recover, and the typical recovery time was ~ 12 hours. This suggests slow molecular desorption from the nanotube sample and that the SWNT chemical sensors can be reversibly used. Heating the exposed sample in air at 200°C led to recovery in ~ 1 hour. For comparison, a high-performance metal oxide sensor (Cd-doped SnO₂) operates at 250°C for detecting 100 ppm of NO₂ with a response time of ~ 50 s, a recovery time of ~ 8 min, and a sensitivity of ~ 300 (8, 18). A polypyrrole-conducting polymer sensor can detect 0.1% NO₂ by an $\sim 10\%$ resistance change in ~ 5 to 10 min at room temperature (12). Thus, the S-SWNT sensors have the advantage of room temperature operation with sensitivity up to 10^3 over these materials.

NH₃-sensing results were obtained with the same SWNT sample after recovery from NO₂ detection (Fig. 3C). The conductance of the SWNT sample was observed to decrease ~ 100 -fold after exposure to a 1% NH₃ flow. The response times to 1% NH₃ for five S-SWNT samples were ~ 1 to 2 min, and the sensitivity was ~ 10 to 100. For comparison,

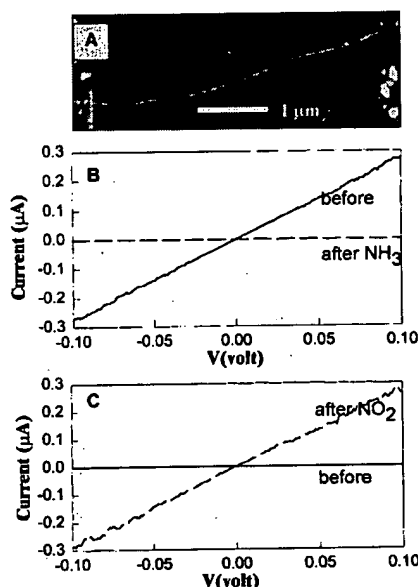


Fig. 1. Changes of electrical characteristics of a semiconducting SWNT in chemical environments. (A) Atomic force microscopy image of a metal/S-SWNT/metal sample used for the experiments. Nanotube diameter is ~ 1.8 nm. The metal electrodes consist of 20-nm-thick Ni, with 60-nm-thick Au on top. (B) Current versus voltage curves recorded before and after exposure to NH₃. (C) Current versus voltage curves recorded under $V_g = +4$ V, before and after NO₂ exposure.

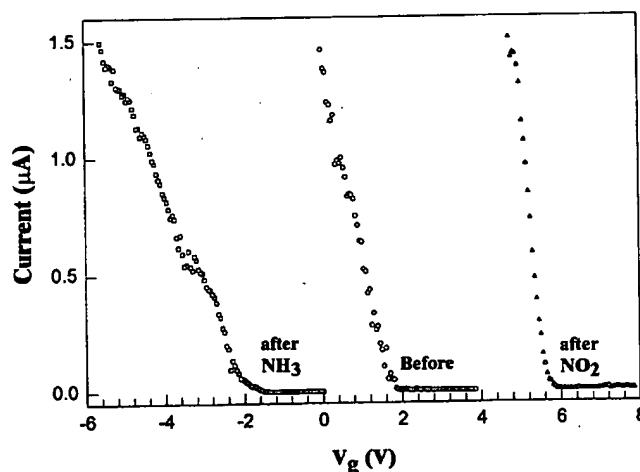


Fig. 2. Chemical gating effects to the semiconducting SWNT. Current versus gate voltage curves before NO₂ (circles), after NO₂ (triangles), and after NH₃ (squares) exposures. The measurements with NH₃ and NO₂ were carried out successively after sample recovery.

REPORTS

metal oxide NH_3 sensors typically operate at 300° to 500°C, with a response time of ~ 1 min and a sensitivity of ~ 1 to 100 toward 200 ppm to 1% NH_3 (8). Conducting polymer sensors can detect 1% NH_3 with a response time of ~ 5 to 10 min by an $\sim 30\%$ resistance change at room temperature (12).

For the S-SWNT samples, lowering the NO_2 concentration to 20 and 2 ppm led to response times of ~ 0.5 to 1 min and ~ 5 min, respectively (Fig. 3B). Lowering the concentration of NH_3 to 0.1% led to a response time of ~ 10 min (Fig. 3D). Thus, for detecting an ~ 10 -fold resistance change of individual S-SWNT samples within minutes of gas exposure, the lower concentration limit is ~ 2 ppm for NO_2 and $\sim 0.1\%$ for NH_3 . Similar sensing results were obtained when Ar or air was used as the carrier gas. This suggests that NH_3 or NO_2 dominates the response of the SWNT samples over molecules in the ambient environment. Over time, repeated sensing and recovery experiments with the S-SWNT samples obtained reproducible results.

To understand the chemical gating effects and the nanotube gas-sensing mechanism, we first considered the fact that S-SWNT samples appear to be hole doped (*p*-type) before the molecular sensing experiments. Hole doping in S-SWNTs has been observed by several groups (6, 15, 16). Possible hole-doping mechanisms include metal electrode-tube work function mismatch (6) and electrostatic effects due to charged species existing on the SiO_2 surface or bulk (19). Because our nanotubes are long (>3

μm), we suggested a hole-doping mechanism (for example, charged chemical groups on SiO_2) operating throughout the nanotube length. As a result of the hole doping, the Fermi level of an S-SWNT is typically located at ~ 25 meV above the valence band (19), which is responsible for the observed conductance of S-SWNT samples at room temperature (typical resistance of 300 kilohms to 5 megohms). Next, we considered the chemical nature of the molecules. NO_2 has an unpaired electron and is known as a strong oxidizer. Upon NO_2 adsorption, charge transfer is likely to occur from an SWNT to NO_2 because of the electron-withdrawing power of the NO_2 molecules. NH_3 , on the other hand, is a Lewis base with a lone electron pair that can be donated to other species. However, it is necessary to investigate whether these qualitative pictures represent the correct mechanisms of molecular sensing with SWNTs.

We carried out first-principles calculations on molecule-SWNT complexes using density functional theory (20). NO_2 is found to bind with a semiconducting (10, 0) tube with an adsorption energy $E_a \sim 0.9$ eV (18.6 kcal/mol) and 0.1 electron charge transfer from the tube to a NO_2 molecule. Charge transfer from the nanotube to NO_2 should be the mechanism for increased hole carriers in an S-SWNT and enhanced conductance. For the NH_3 -SWNT system, calculations found no binding affinity between NH_3 molecules and the (10, 0) tube. We suggest two possible indirect routes through which NH_3 molecules may affect S-SWNTs. The first is that NH_3

binds to hydroxyl groups on the SiO_2 substrate (21), which could partially neutralize the negatively charged groups on the SiO_2 surface and lead to positive electrostatic gating to the S-SWNT. Second, interactions may exist between NH_3 molecules and an SWNT through other species. It was previously found that NH_3 can interact strongly with adsorbed oxygen species on graphite (22). Preadsorbed oxygen species on a nanotube could interact with NH_3 and affect its electrical properties. These possible mechanisms require further experimental and theoretical investigations.

We also investigated the electrical properties of metallic SWNTs in various chemical environments. A metallic tube was identified by small changes in the conductance with gate voltage (a typical resistance of ~ 20 to 200 kilohms) (16). We found that, for a typical metallic SWNT, exposure to NO_2 or NH_3 increased or decreased, respectively, the conductance of the sample by $\leq 30\%$. The explanation for these small changes is that, for a metallic SWNT, small shifts of the Fermi level do not result in a substantial change in the density of states at the Fermi level and, thus, in the charge carriers in the nanotube.

The interactions between NO_2 and NH_3 with graphite have been previously investigated (22–25). For SWNTs, molecular interaction effects have been studied in the case of Br and I intercalation with bulk samples of SWNT ropes (26, 27). The intercalation leads to substantially enhanced sample conductance (26, 27). Our report is concerned with molecular interactions with individual semiconducting and metallic

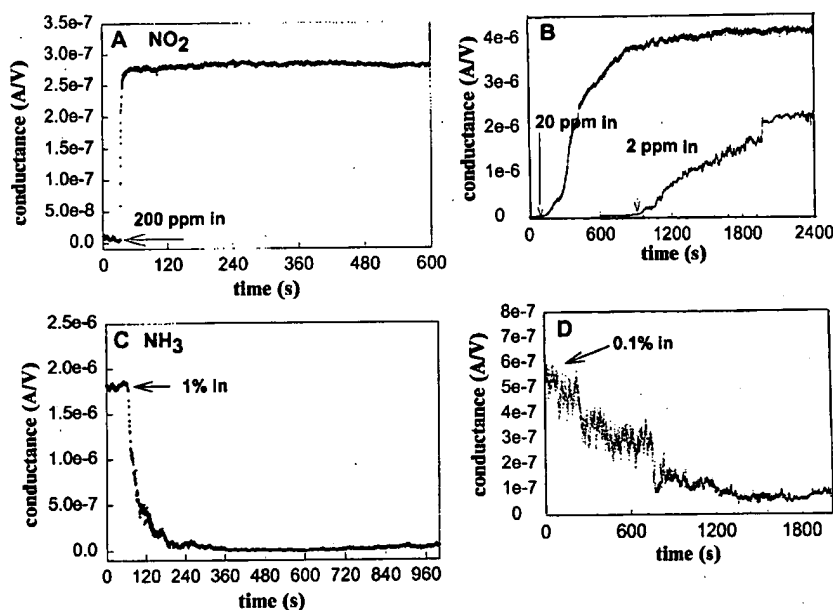


Fig. 3. Electrical response of a semiconducting SWNT to gas molecules. (A) Conductance (under $V_g = +4$ V, in an initial insulating state) versus time in a 200-ppm NO_2 flow. (B) Data for a different S-SWNT sample in 20- and 2-ppm NO_2 flows. The two curves are shifted along the time axis for clarity. (C) Conductance ($V_g = 0$, in an initial conducting state) versus time recorded with the same S-SWNT sample as in (A) in a flow of Ar containing 1% NH_3 . (D) Data recorded with a different S-SWNT sample in a 0.1% NH_3 flow. Read 3.5×10^{-7} , for example, as 3.5×10^{-7} .

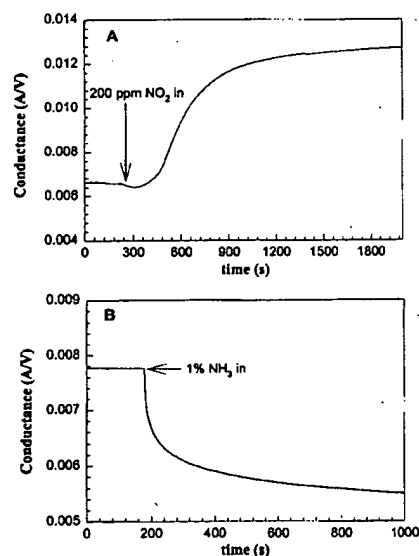


Fig. 4. Electrical response of bulk SWNT mats to NO_2 and NH_3 molecules. (A) Conductance versus time data recorded with an SWNT mat in 200 ppm of NO_2 . (B) Conductance versus time recorded with an SWNT mat in 1% NH_3 .

SWNTs. We have also investigated the effects of NO₂ and NH₃ on the electrical properties of mats of SWNT ropes made from as-grown laser ablation materials. In a 200-ppm NO₂ flow, the resistance of an SWNT mat is found to decrease from $R = 150$ to 80 ohms ($R_{\text{before}}/R_{\text{after}} \sim 2$) in ~ 10 min (Fig. 4A). In a 1% NH₃ flow, the resistance of a second SWNT mat increases from 120 to 170 ohms ($R_{\text{after}}/R_{\text{before}} \sim 1.5$) in ~ 10 min (Fig. 4B). In these bulk SWNT samples, the molecular interaction effects are averaged over metallic and semiconducting tubes. Also, the inner tubes in SWNT ropes are blocked from interacting with NO₂ and NH₃ because the molecules are not expected to intercalate into SWNT ropes. This explains the small resistance change of bulk SWNT mats by gas exposure compared to that of an individual S-SWNT.

The main feature of individual S-SWNT sensors, besides their small sizes, is that they operate at room temperature with sensitivity as high as 10^3 . An individual nanotube sensor can be used to detect different types of molecules. The selectivity is achieved by adjusting the electrical gate to set the S-SWNT sample in an initial conducting or insulating state. The fast response of a nanotube sensor can be attributed to the full exposure of the nanotube surface area to chemical environments. Thus, nanotube molecular wires should be promising for advanced miniaturized chemical sensors.

References and Notes

- M. S. Dresselhaus, G. Dresselhaus, P. C. Eklund, *Science of Fullerenes and Carbon Nanotubes* (Academic Press, San Diego, CA, 1996).
- H. Dai, J. H. Hafner, A. G. Rinzler, D. T. Colbert, R. E. Smalley, *Nature* **384**, 147 (1996).
- S. Wong, E. Joselevich, A. Woolley, C. Cheung, C. Lieber, *Nature* **394**, 52 (1998).
- W. A. de Heer, A. Chatelain, D. Ugarte, *Science* **270**, 1179 (1995).
- R. H. Baughman et al., *Science* **284**, 1340 (1999).
- S. Tans, A. Verschueren, C. Dekker, *Nature* **393**, 49 (1998).
- Special issue on Gas-Sensing Materials, *MRS Bull.* **24** (1999).
- Y. Shimizu and M. Egashira, *MRS Bull.* **24**, 18 (1999).
- Y. Takao, K. Miyazaki, Y. Shimizu, M. Egashira, *J. Electrochem. Soc.* **141**, 1028 (1994).
- H. M. McConnell et al., *Science* **257**, 1906 (1992).
- A. Mandelis and C. Christofilides, *Physics, Chemistry and Technology of Solid State Gas Sensor Devices* (Wiley, New York, 1993).
- J. Miasik, A. Hooper, B. Tofield, *J. Chem. Soc. Faraday Trans. 1* **82**, 1117 (1986).
- S. Capone, S. Mongelli, R. Rella, P. Siciliano, L. Valli, *Langmuir* **15**, 1748 (1999).
- M. C. Longergan et al., *Chem. Mater.* **8**, 2298 (1996).
- R. Martel, T. Schmidt, H. R. Shea, T. Hertel, P. Avouris, *Appl. Phys. Lett.* **73**, 2447 (1998).
- T. Soh et al., *Appl. Phys. Lett.* **75**, 627 (1999).
- J. Kong, H. Soh, C. F. Quate, H. Dai, *Nature* **395**, 878 (1998).
- G. Sberveglieri, S. Groppelli, P. Nelli, *Sens. Actuators* **B4**, 457 (1991).
- C. Zhou, J. Kong, H. Dai, in preparation.
- S. Peng and K. Cho, in preparation.
- M. L. Hair, *Infrared Spectroscopy in Surface Chemistry* (Dekker, New York, 1967).
- A. Cheng and W. A. Steele, *J. Chem. Phys.* **92**, 3867 (1990).
- P. Sjövall, S. K. So, B. Kasemo, R. Franchy, W. Ho, *Chem. Phys. Lett.* **172**, 125 (1990).
- P. Rowntree, G. Scoles, J. Xu, *J. Chem. Phys.* **92**, 3853 (1990).
- P. A. Heiney, *J. Phys. Chem. Solids* **53**, 1333 (1992).
- R. S. Lee, H. J. Kim, J. E. Fischer, A. Thess, R. E. Smalley, *Nature* **388**, 255 (1997).
- L. Grigorian et al., *Phys. Rev. Lett.* **80**, 5560 (1998).
- We thank J. Han, L. Yang, and M. Tang for discussions.

Supported by NSF, Defense Advanced Research Projects Agency/Office of Naval Research, Petroleum Research Fund of the American Chemical Society, Semiconductor Research Cooperation, the Camille and Henry Dreyfus Foundation, and the Laboratory for Advanced Materials at Stanford University.

1 October 1999; accepted 24 November 1999

Single-File Diffusion of Colloids in One-Dimensional Channels

Q.-H. Wei,*† C. Bechinger,* P. Leiderer

Single-file diffusion, prevalent in many processes, refers to the restricted motion of interacting particles in narrow micropores with the mutual passage excluded. A single-filing system was developed by confining colloidal spheres in one-dimensional circular channels of micrometer scale. Optical video microscopy study shows evidence that the particle self-diffusion is non-Fickian for long periods of time. In particular, the distribution of particle displacement is a Gaussian function.

Single-file diffusion (SFD) occurs when the individual pores of the medium are so narrow that the particles are unable to pass each other (1, 2). The sequence of particles remains unchanged over time, and thus, the basic principle of diffusion as a physical mixing process comes into question. The concept of SFD was originally introduced more than 40 years ago in biophysics to account for the transport of water and ions through molecular-sized channels in membranes (3); since then, in addition to biological systems (4, 5), SFD is also discussed in the context of interaction of Markov chains in statistics (6), the transportation of adsorbate molecules through zeolites (2), and charge-carrier migration in one-dimensional (1D) polymer and superionic conductors (7). Furthermore, SFD is also related to surface growth phenomena through some mapping (8).

As the mutual passage of particles is prohibited in single-filing (SF) systems, the movements of individual particles are correlated, even at long time periods, because the displacement of a given particle over a long distance necessitates the motion of many other particles in the same direction. This correlation is reflected in the long-time behavior of the mean-square displacement (MSD), which has been predicted for an infinite system to be (6, 7, 9–11)

$$\langle \Delta x^2 \rangle = 2F\sqrt{t} \quad (1)$$

Faculty of Physics, University of Konstanz, Postfach M676, D-78457 Konstanz, Germany.

*To whom correspondence should be addressed. E-mail: qwei+@pitt.edu (Q.-H.W.) and clemens.bechinger@uni-konstanz.de (C.B.)

†Present address: Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, PA 15260, USA.

where F is the SF mobility and t is time. Accordingly, SFD processes, in contrast to 2D and 3D self-diffusion seen in colloidal systems (12), cannot be described by a diffusion coefficient; that is, the SFD does not obey Fick's laws.

Experimental evidence confirming non-Fickian behavior was unavailable for a long time because of the lack of ideal experimentally accessible SF systems. Recently, measurements of SFD became feasible in artificial crystalline zeolites. Adsorbate molecules, like methane or CF₄ with diameters of 3.8 and 4.7 Å, respectively, confined in AlPO₄-5 zeolite with a pore size of 7.3 Å, are considered to be good realizations of SF systems. Although some experimental evidence for the occurrence of SFD was found by pulsed field gradient nuclear magnetic resonance study (13, 14), some results from different groups and experimental methods are still in contradiction, even for the same system (15, 16), as indicated by Hahn and Kärger (17), who suggest and explore several possible reasons. Other effects, such as attractive particle interaction (18), the possible existence of correlations between particles of neighboring pores (19), have also been shown to play a vital role in the mechanism and rates of intracrystalline diffusion. Because of the shortage of structural information on the atomic level, the mechanism of molecular diffusion in zeolites, however, is still under debate.

We created a well-defined SFD model system by confining paramagnetic colloidal spheres of several micrometers in a set of circular trenches fabricated by photolithography. The channels are well-characterized, and the particle-particle interaction can be precisely adjusted by an external magnetic field. Moreover, because the time and length scales in such a colloidal system are easily accessed

AN 1997:671375 HCAPLUS Full-text

DN 127:351498

ED Entered STN: 23 Oct 1997

TI Bending and buckling of carbon nanotubes under large strain

AU Falvo, M. R.; Clary, G. J.; Taylor, R. M., II; Chi, V.; Brooks, F. P., Jr.; Washburn, S.; Superfine, R.

CS Dep. Physics and Astronomy, Univ. North Carolina, Chapel Hill, NC, 27599, USA

SO Nature (London) (1997), 389(6651), 581-584

CODEN: NATUAS; ISSN: 0028-0836

PB Macmillan Magazines

DT Journal

LA English

CC 65-5 (General Physical Chemistry)

AB The curling of a graphitic sheet to form carbon nanotubes produces a class of materials that seem to have extraordinary elec. and mech. properties. In particular, the high elastic modulus of the graphite sheets means that the nanotubes might be stiffer and stronger than any other known material, with beneficial consequences for their application in composite bulk materials and as **individual elements** of nanometer-scale devices and **sensors**. The mech. properties are predicted to be **sensitive** to details of their structure and to the presence of defects, which means that measurements on **individual nanotubes** are essential to establish these properties. Here we show that multi-walled carbon nanotubes can be bent repeatedly through large angles using the tip of an atomic force microscope, without undergoing catastrophic failure. We observe a range of responses to this high-strain deformation, which together suggest that nanotubes are remarkably flexible and resilient.

IT Atomic force microscopes

Bending

Deformation (mechanical)

Flexibility

Strain

(bending and buckling of carbon nanotubes under large strain using atomic force microscope tip)

IT Nanotubes

Nanotubes

RL: PEP (Physical, engineering or chemical process); PRP (Properties);

PROC (Process)

(carbon fibers; bending and buckling of carbon nanotubes under large strain using atomic force microscope tip)

IT Carbon fibers, properties

Carbon fibers, properties

RL: PEP (Physical, engineering or chemical process); PRP (Properties);

PROC (Process)

(nanotube; bending and buckling of carbon nanotubes under large strain using atomic force microscope tip)

RE.CNT 25 THERE ARE 25 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Axelrad, E; Int J Non-Linear Mech 1985, V20, P249

(2) Chopra, N; Nature 1995, V377, P135 HCAPLUS

(3) Dai, H; Nature 1996, V384, P147 HCAPLUS

(4) Despres, J; Carbon 1995, V33, P87 HCAPLUS

(5) Dresselhaus, M; Science of Fullerenes and Carbon Nanotubes 1996

(6) Ebbesen, T; Carbon Nanotubes: Preparation and Properties 1997, P225 HCAPLUS

(7) Ebbesen, T; Nature 1992, V358, P220 HCAPLUS

(8) Finch, M; Surface Modification Tools in a Virtual Environment Interface to a Scanning Probe Microscope 1995, P13

(9) Fritsch, D; Information Processing in Medical Imaging, Proc IPMI '95 1994, P365

(10) Iijima, S; J Chem Phys 1996, V104, P2089 HCAPLUS

(11) Iijima, S; Nature 1991, V354, P56 HCAPLUS

(12) Ju, G; Int J Solids Structures 1992, V29, P1143

(13) Landau, L; Theory of Elasticity 1986

(14) Lieber, C; Bull Am Phys Soc 1997, V42, P591

(15) Lu, J; Phys Rev Lett 1997, V79, P1297 HCAPLUS

(16) Pizer, S; Comput Vision Image Understand, in the press

(17) Robertson, D; Phys Rev B 1992, V45, P12592

L58 ANSWER 1 OF 10 HCAPLUS COPYRIGHT ACS on STN

AN 2002:632853 HCAPLUS

DN 137:162911

ED Entered STN: 22 Aug 2002

TI Use of carbon nanotubes as chemical sensors
by incorporation of fluorescent molecules within the tube

IN Yedur, Sanjay K.; Singh, Bhanwar; Choo, Bryan K.

PA Advanced Micro Devices, Inc., USA

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6437329	B1	20020820	US 1999-428098	19991027 <--
US 1999-428098		19991027 <--		

AB A system for analyzing a film and detecting a defect associated therewith includes a scanning probe microscope having a nanotube tip with a material associated therewith which exhibits a characteristic that varies with respect to a film composition at a location corresponding to the nanotube tip. The system also includes a detection system for detecting the material characteristic and a controller operatively coupled to the detection system and the scanning probe microscope. The controller configured to receive information associated with the detected characteristic and use the information to determine whether the film contains a defect at the location corresponding to the nanotube tip. The invention also includes a method of detecting a film composition at a particular location of a film or substrate. The method includes associating a material exhibiting a characteristic which varies with respect to a film composition with a nanotube tip of a scanning probe microscope and detecting the characteristic. The method then includes the step of determining a composition of a portion of the film using the detected characteristic.

ST carbon nanotube sensor fluorescent mol tube

IT Nanotubes

(carbon; system and method for detection of defects on or in various films in semiconductor processing using carbon nanotubes containing fluorescent mols. as chemical sensors)

IT Defects in solids

Films

Fluorescent substances

Optical detectors

Scanning probe microscopes

Spectrometers

(system and method for detection of defects on or in various films in semiconductor processing using carbon nanotubes containing fluorescent mols. as chemical sensors)

RE.CNT 18 THERE ARE 18 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Ajayan; US 5457343 A 1995 HCAPLUS
- (2) Anon; <http://www.che.utoledo.edu/nadarajah/webpages/whatsafm.html> 1999
- (3) Anon; <http://www.rdg.ac.uk/~scscharip/tubes.htm> 2000
- (4) Anon; <http://www.sst.ph.ic.ac.uk/photronics/intro/AFM.html> 1999
- (5) Anon; <http://www.umsl.edu/~fraundor/stm97x.html> 1999
- (6) Bethune; US 5424054 A 1995 HCAPLUS
- (7) Chang; US 5916642 A 1999 HCAPLUS
- (8) Green; US 5346683 A 1994 HCAPLUS
- (9) Henderson; US 5763768 A 1998 HCAPLUS
- (10) Lieber; US 6159742 A 2000 HCAPLUS
- (11) Marcus; US 5201992 A 1993
- (12) Massey; US 5866434 A 1999 HCAPLUS
- (13) McLean; US 5747120 A 1998 HCAPLUS
- (14) Mitsui; US 5611942 A 1997 HCAPLUS
- (15) Muramatsu; US 5877412 A 1999
- (16) Neukermans; US 5393647 A 1995
- (17) Quake; US 6002471 A 1999 HCAPLUS
- (18) Yagi; US 5986256 A 1999 HCAPLUS

L35 ANSWER 1 OF 3 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 2001:453349

DN 135:40137

ED Entered STN: 22 Jun 2001

TI Carbon nanotube devices

IN Dai, Hongjie; Kong, Jing

PA Board of Trustees of the Leland Stanford Junior University, USA

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2001044796	A1	20010621	WO 2000-US42186	20001115 <--
	WO 2001044796	C2	20030130		
	US 6528020	B1	20030304	US 2000-574393	20000519 <--
	EP 1247089	A1	20021009	EP 2000-992511	20001115 <--
	JP 2003517604	T2	20030527	JP 2001-545835	20001115 <--
	US 2003068432	A1	20030410	US 2002-299610	20021118 <--
PRAI	US 1999-171200P	P	19991215 <--		
	US 1998-133948	A3	19980814 <--		
	US 2000-574393	A3	20000519 <--		
	WO 2000-US42186	W	20001115 <--		

AB This invention provides an assembly of novel nanotube devices that can be employed in a variety of applications. In particular, the nanotube devices of the present invention provide a new class of **versatile chemical and biol. sensors**. The present invention describes methods for growing **individual nanotubes** in a controlled fashion and for manipulating and integrating the nanotubes into functional devices. It further provides methods for modifying the nanotubes such that their **sensitivity to a wide range of chemical and biol. species** can be achieved.

IT **Biosensors**

Dopants

Semiconductor materials

Sensors

(design, fabrication and operation of nanotube based **sensors** and **biosensors**)

IT Enzymes, uses

Thiols (organic), uses

RL: ARG (Analytical reagent use); DEV (Device component use); ANST (Analytical study); USES (Uses)

(design, fabrication and operation of nanotube based **sensors** and **biosensors**)

IT Oxides (inorganic), analysis

RL: ARU (Analytical role, unclassified); DEV (Device component use); ANST (Analytical study); USES (Uses)

(design, fabrication and operation of nanotube based **sensors** and **biosensors**)

IT Hydrocarbons, processes

RL: PEP (Physical, engineering or chemical process); PROC (Process) (design, fabrication and operation of nanotube based **sensors** and **biosensors**)

IT Catalysts

(island; design, fabrication and operation of nanotube based **sensors** and **biosensors**)

IT 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 7440-16-6, Rhodium, uses 7440-57-5, Gold, uses 13463-67-7, Titanium oxide (TiO₂), uses

RL: ARG (Analytical reagent use); DEV (Device component use); ANST (Analytical study); USES (Uses)

(design, fabrication and operation of nanotube based **sensors** and **biosensors**)

IT 1309-37-1, Ferric oxide, analysis 1344-28-1, Alumina, analysis 7429-90-5, Aluminum, analysis 7439-89-6, Iron, analysis 7439-98-7, Molybdenum, analysis 7440-02-0, Nickel, analysis 7440-18-8, Ruthenium, analysis 7440-21-3, Silicon, analysis 7440-32-6, Titanium, analysis 7440-44-0, Carbon, analysis 7440-47-3, Chromium, analysis 7440-48-4, Cobalt, analysis 7440-66-6, Zinc, analysis 7631-86-9, Silica, analysis 12033-89-5, Silicon nitride, analysis 12670-46-1 14808-60-7, Quartz,

L65 ANSWER 1 OF 35 HCAPLUS COPYRIGHT ACS on STN

AN 2002:488087 HCAPLUS

DN 137:40967

ED Entered STN: 28 Jun 2002

TI Fabrication of conductive/non-conductive nanocomposites by laser evaporation

IN McGill, R. Andrew; Chrisey, Douglas B.; Pique, Alberto

PA The United States of America as represented by the Secretary of the Navy,
USA

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2002081397	A1	20020627	US 2001-966772	20011001 <--
	US 6660343	B2	20031209		
PRAI	US 1999-117467P	P	19990127	<--	
	US 2000-492071	A3	20000127	<--	

<--
AB A composite layer of a sorbent, chemoselective, non-elec.-conducting polymer and nanoparticles of an elec. conducting material dispersed throughout the polymer is formed on a substrate by pulsed laser deposition, matrix assisted pulsed laser evaporation or matrix assisted pulsed laser evaporation direct writing.

ST fabrication conductive nanocomposite evapn; chem sensor
conductive nanoparticle chemselective sorbent polymer

IT **Nanotubes**
(carbon; fabrication of conductive/non-conductive nanocomposites by laser evaporation)

IT Vapor deposition process
(chemical, laser-assisted, pulsed; fabrication of conductive/non-conductive nanocomposites by laser evaporation)

IT Composites
Sensors
Sorbents
(fabrication of conductive/non-conductive nanocomposites by laser evaporation)

IT Fullerenes
RL: TEM (Technical or engineered material use); USES (Uses)
(fabrication of conductive/non-conductive nanocomposites by laser evaporation)

IT Metals, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(nanoparticles; fabrication of conductive/non-conductive nanocomposites by laser evaporation)

IT 24969-06-0, Polyepichlorohydrin
RL: POF (Polymer in formulation); TEM (Technical or engineered material use); USES (Uses)
(fabrication of conductive/non-conductive nanocomposites by laser evaporation)

IT 7782-42-5, Graphite, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(particles; fabrication of conductive/non-conductive nanocomposites by laser evaporation)

L32 ANSWER 8 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 2002:466304 HCAPLUS

DN 137:40958

ED Entered STN: 21 Jun 2002

TI Nanosensors

IN Lieber, Charles M.; Park, Hongkun; Wei, Quinqiao; Cui, Yi; Liang, Wenjie

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002048701	A2	20020620	WO 2001-US48230	20011211 <--
WO 2002048701	A3	20030424		
WO 2002048701	C2	20030918		
WO 2002048701	C1	20031106		
CA 2430888	AA	20020620	CA 2001-2430888	20011211 <--
AU 2002029046	A5	20020624	AU 2002-29046	20011211 <--
US 2002117659	A1	20020829	US 2001-20004	20011211 <--
EP 1342075	A2	20030910	EP 2001-990181	20011211 <--
JP 2004515782	T2	20040527	JP 2002-549958	20011211 <--
JP 2004535066	T2	20041118	JP 2003-511316	20020520
PRAI US 2000-254745P	P	20001211		
US 2001-292035P	P	20010518		
US 2001-291896P	P	20010518		
US 2001-292045P	P	20010518		
US 2001-292121P	P	20010518		
US 2001-935776	A	20010822		
US 2001-348313P	P	20011109		
US 2001-20004	A	20011211		
WO 2001-US48230	W	20011211		
US 2002-354642P	P	20020206		
WO 2002-US16133	W	20020520		

AB Elec. devices comprised of nanowires are described, along with methods of their manufacture and use. The nanowires can be nanotubes and nanowires. The surface of the nanowires may be selectively functionalized. Nanodetector devices are described.

IT Nanotubes

(carbon; design and operation of nanowire based nanosensors for chemical and biol. anal.)

IT Dopants

Field effect transistors

Films

Glass substrates

Hydrogels

Linking agents

Polymer chains

Quantum dot devices

Quantum wire devices

Sensors

p-n Semiconductor junctions

(design and operation of nanowire based nanosensors for chemical and biol. anal.)

IT Lipids, analysis

Steroids, analysis

RL: ANT (Analyte); ANST (Analytical study)

(design and operation of nanowire based nanosensors for chemical and biol. anal.)

IT Antibodies and Immunoglobulins

Antigens

Carbohydrates, uses

DNA

Enzymes, uses

Nucleic acids

Oxides (inorganic), uses

Polyamides, uses

Polyesters, uses

Polyimides, uses

Proteins

Selenides

Sulfides, uses

RL: ARG (Analytical reagent use); DEV (Device component use); ANST

(Analytical study); USES (Uses)

(design and operation of nanowire based nanosensors for chemical and biol. anal.)

IT 50-99-7, D-Glucose, analysis 124-38-9, Carbon dioxide, analysis

7782-44-7, Oxygen, analysis

RL: ANT (Analyte); ANST (Analytical study)

(design and operation of nanowire based nanosensors)

L32 ANSWER 9 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 2002:367184 HCAPLUS

DN 136:375354

ED Entered STN: 16 May 2002

TI Method for making surfactant-templated thin films

IN Brinker, C. Jeffrey; Lu, Yunfeng; Fan, Hongyou

PA Sandia Corporation, USA

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	---	-----	-----	-----
PI US 6387453	B1	20020514	US 2000-517873	20000302 <--
PRAI US 2000-517873		20000302 <--		

AB Disclosed is an evaporation-induced self-assembly method to prepare a porous, surfactant-templated, thin film by mixing a SiO₂ sol, a solvent, a surfactant, and an interstitial compound, evaporating a portion of the solvent to form a liquid, crystalline thin film mesophase material, and then removal of the surfactant template. Coating onto a substrate produces a thin film with the interstitial compound either covalently bonded to the internal surfaces of the ordered or disordered mesostructure framework or phys. entrapped within the ordered or disordered mesostructured framework. Particles can be formed by aerosol processing or spray drying rather than coating onto a substrate. The selection of the interstitial compound provides a means for developing thin films for applications including membranes, **sensors**, low dielec. constant films, photonic materials and optical hosts.

IT 7440-22-4P, Silver, preparation

RL: SPN (Synthetic preparation); PREP (Preparation)

(**nanowire**; preparation method of silver **nanowire** using surfactant-templated thin film)

L62 ANSWER 2 OF 14 HCAPLUS COPYRIGHT ACS on STN

AN 2002:315247 HCAPLUS
 DN 136:321690
 ED Entered STN: 26 Apr 2002
 TI **Sensors comprising a semi-conductive polymer**
 IN Bohanian, Hamed S.; Handy, Erik S.; Meuse, Arthur J.; Jahngen, Edwin Georg
 Emil

PA Triton Systems, Inc., USA
 PATENT NO. KIND DATE APPLICATION NO. DATE

 PI WO 2002033732 A2 20020425 WO 2001-US31917 20011012 <--
 WO 2002033732 A3 20020906
 WO 2002033732 C2 20030515
PRAI US 2000-240152P P 20001014 <--

AB Disclosed is an implementation for detecting at least one analyte in a sample. In one embodiment, the implementation includes a sensor array featuring one or a plurality of test sensors. Typically, each of the test sensors includes a set of electrodes configured with a insulating surface to form a chamber. The implementation further includes a semi-conductive film positioned at least in the chamber; and a polyfunctional linker comprising a first end attached to a receptor and a second end. Also provided are methods for making and using the implementation.

IT Antibodies and Immunoglobulins
 RL: ARU (Analytical role, unclassified); ANST (Analytical study)
 (IgG; sensors comprising a semi-conductive polymer)

IT Prion proteins
 RL: ARU (Analytical role, unclassified); ANST (Analytical study)
 (PrPSc; sensors comprising a semi-conductive polymer)

IT Nanotubes
 (carbon; sensors comprising a semi-conductive polymer)

IT RNA
 RL: ARU (Analytical role, unclassified); ANST (Analytical study)
 (derivs.; sensors comprising a semi-conductive polymer)

IT Nucleic acids
 RL: ARU (Analytical role, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); ANST (Analytical study); PROC (Process)
 (derivs.; sensors comprising a semi-conductive polymer)

IT Immunoassay
 (enzyme-linked immunosorbent assay; sensors comprising a semi-conductive polymer)

IT Electrodes
 (interdigitated; sensors comprising a semi-conductive polymer)

IT Microarray technology
 (sensor array; sensors comprising a semi-conductive polymer)

IT Atomic force microscopy
Biosensors
 Cell
 Computer program
 Electric capacitance
 Electric conductivity
 Electric resistance
 Flow
 Food poisoning
 Fungi
 Gel permeation chromatography
 Langmuir-Blodgett films
 Light scattering
 Molecular association
 Molecular orientation
 Mycobacterium tuberculosis
 Nanostructures
 Pumps
 Self-assembly
 Streptococcus pneumoniae
 Thermogravimetric analysis
 UV radiation
 Virus

- L62 ANSWER 3 OF 14 HCAPLUS COPYRIGHT ACS on STN

AN 2002:309809 HCAPLUS

DN 136:289940

ED Entered STN: 25 Apr 2002

TI Apparatus and method for the analysis of nucleic acids hybridization on high density DNA chips

IN Poponin, Vladimir

PA Virtual Pro, Inc., USA

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6376177	B1	20020423	US 1999-413596	19991006
US 2002123050	A1	20020905	US 2001-876298	20010607 <--
PRAI US 1999-413596	A3	19991006	<--	

<--

AB The invention generally relates to a new gene probe biosensor employing near field surface enhanced Raman scattering (NFSERS) for direct spectroscopic detection of hybridized mols. (such as hybridized DNA) without the need for labels, and the invention also relates to methods for using the biosensor. The invention provides direct spectroscopic detection of DNA-DNA, DNA-RNA, and RNA-RNA hybridization.

IT Apparatus

Biosensors

DNA microarray technology

IR lasers

Microarray technology

Nucleic acid hybridization

Optical recording

UV lasers

(apparatus and method for the anal. of nucleic acids hybridization on high d. DNA chips)

IT Laser radiation

(argon ion; apparatus and method for the anal. of nucleic acids hybridization on high d. DNA chips)

IT Nanotubes

(carbon, colloid covered plates as SRS substrate; apparatus and method for the anal. of nucleic acids hybridization on high d. DNA chips)

IT Peptide nucleic acids

RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)

(chips as SERS substrate; apparatus and method for the anal. of nucleic acids hybridization on high d. DNA chips)

IT DNA

RL: ANT (Analyte); ANST (Analytical study)

(double-stranded, detection; apparatus and method for the anal. of nucleic acids hybridization on high d. DNA chips)

IT Optical instruments

(near field coupling; apparatus and method for the anal. of nucleic acids hybridization on high d. DNA chips)

IT DNA

RNA

RL: ANT (Analyte); ANST (Analytical study)

(samples; apparatus and method for the anal. of nucleic acids hybridization on high d. DNA chips)

IT Raman spectra

(surface enhanced; apparatus and method for the anal. of nucleic acids hybridization on high d. DNA chips)

IT 7440-06-4, Platinum, biological studies 7440-22-4, Silver, biological studies 7440-57-5, Gold, biological studies

RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)

(colloid covered plates as SRS substrate; apparatus and method for the anal. of nucleic acids hybridization on high d. DNA chips)

L32 ANSWER 10 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 2002:158133 HCAPLUS
 DN 136:209112
 ED Entered STN: 01 Mar 2002
 TI Doped elongated semiconductors, growing such semiconductors, devices including such semiconductors, and fabricating such devices
 IN Lieber, Charles M.; Cui, Ying; Duan, Xiangfeng; Huang, Yung-Sheng
 PA President and Fellows of Harvard College, USA
 SO PCT Int. Appl., 173 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 IC ICM H01L021-00
 CC 76-3 (Electric Phenomena)
 Section cross-reference(s): 9, 73, 75, 77

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002017362	A2	20020228	WO 2001-US26298	20010822 <--
	WO 2002017362	C1	20021121		
	CA 2417992	AA	20020228	CA 2001-2417992	20010822 <--
	AU 2001086649	A5	20020304	AU 2001-86649	20010822 <--
	US 2002130311	A1	20020919	US 2001-935776	20010822 <--
	EP 1314189	A2	20030528	EP 2001-966109	20010822 <--
	JP 2004507104	T2	20040304	JP 2002-521336	20010822 <--
	JP 2004535066	T2	20041118	JP 2003-511316	20020520
PRAI	US 2000-226835P	P	20000822	<--	
	US 2000-254745P	P	20001211	<--	
	US 2001-291896P	P	20010518		
	US 2001-292035P	P	20010518		
	US 2001-292045P	P	20010518		
	US 2001-292121P	P	20010518		
	US 2001-935776	A	20010822		
	WO 2001-US26298	W	20010822		
	US 2001-348313P	P	20011109		
	US 2001-20004	A	20011211		
	US 2002-354642P	P	20020206		
	WO 2002-US16133	W	20020520		

AB A bulk-doped semiconductor that is at least one of the following: a single crystal, an elongated and bulk-doped semiconductor that, at any point along its longitudinal axis, has a largest cross-sectional dimension <500 nm, and a free-standing and bulk-doped semiconductor with at least one portion having a smallest width of <500 nm. Such a semiconductor may comprise an interior core comprising a 1st semiconductor; and an exterior shell comprising a different material than the 1st semiconductor. Such a semiconductor may be elongated and may have, at any point along a longitudinal section of such a semiconductor, a ratio of the length of the section to a longest width which is >4:1, or >10:1, or >100:1, or even >1000:1. At least one portion of such a semiconductor may have a smallest width of <200 nm, or <150 nm, or <100 nm, or <80 nm, or <70 nm, or <60 nm, or <40 nm, or <20 nm, or <10 nm, or even <5 nm. Such a semiconductor may be a single crystal and may be free-standing. Such a semiconductor may be either lightly n-doped, heavily n-doped, lightly p-doped or heavily p-doped. Such a semiconductor may be doped during growth. Such a semiconductor may be part of a device, which may include any of a variety of devices and combinations thereof, and a variety of assembling techniques may be used to fabricate devices from such a semiconductor. Two or more of such semiconductors, including an array of such semiconductors, may be combined to form devices, for example, to form a crossed p-n junction of a device. Such devices at certain sizes may exhibit quantum confinement and other quantum phenomena, and the wavelength of light emitted from one or more of such semiconductors may be controlled by selecting a width of such semiconductors. Such semiconductors and device made therefrom may be used for a variety of applications.

ST elongated doped semiconductor device fabrication

IT Memory devices
 (DRAM (dynamic random access); preparation of elongated doped semiconductor for devices)

IT Memory devices
 (SRAM (static random access); preparation of elongated doped semiconductor for devices)

IT Sensors

L32 ANSWER 3 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 2004:681364 DN 141:198384

ED Entered STN: 20 Aug 2004

TI Semiconductor and device nanotechnology and methods for their manufacture

IN Yadav, Tapesh; Routkevitch, Dmitri; Mardilovich, Peter; Govyadinov, Alex;

Hooker, Stephanie; Williams, Stephen S.

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2004161949	A1	20040819	US 2004-783629	20040220 <--
	US 6344271	B1	20020205	US 1999-274517	19990323 <--
	US 2002014182	A1	20020207	US 2001-790036	20010220 <--
	US 2002118027	A1	20020829	US 2001-4258	20011024 <--
	US 6705152	B2	20040316		
	US 2002051883	A1	20020502	US 2001-996471	20011127 <--
	US 6713176	B2	20040330		
	US 2002079476	A1	20020627	US 2001-996500	20011127 <--
	US 6607821	B2	20030819		
	US 2002160190	A1	20021031	US 2002-147835	20020517 <--
	US 6602543	B2	20030805		
	US 2002170593	A1	20021121	US 2002-150201	20020517 <--
	US 6607779	B2	20030819		
	US 2002176987	A1	20021128	US 2002-150722	20020517 <--
	US 6602595	B2	20030805		
	US 2003012952	A1	20030116	US 2002-147599	20020517 <--
	US 6569518	B2	20030527		
	US 2003012953	A1	20030116	US 2002-147636	20020517 <--
	US 6569490	B2	20030527		
	US 6554609	B2	20030429	US 2002-147837	20020517 <--
	US 2002160191	A1	20021031		
	US 6562495	B2	20030513	US 2002-150140	20020517 <--
	US 2002172826	A1	20021121		
	US 6572672	B2	20030603	US 2002-147829	20020517 <--
	US 2002164482	A1	20021107		
	US 6576355	B2	20030610	US 2002-147954	20020517 <--
	US 2002168522	A1	20021114		
PRAI	US 1998-107318P	P	19981106	<--	
	US 1998-111442P	P	19981208	<--	
	US 1999-274517	A3	19990323	<--	
	US 2000-242905P	P	20001024	<--	
	US 2001-4258	A1	20011024		
	US 2001-996471	A2	20011127		
	US 1998-83893	A3	19980522	<--	

AB Device nanotechnol. based on Si wafers and other substrates is described. Methods for preparing such devices are discussed. The teachings allow integration of current semiconductor device, **sensor** device and other device fabrication methods with nanotechnol. Integration of nanotubes and **nanowires** to wafers is discussed. **Sensors**, electronics, biomedical and other devices are presented.

IT Semiconductor gas **sensors**
Semiconductor nanostructures
Semiconductor **sensors**

L32 ANSWER 4 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 2004:80239 HCAPLUS

DN 140:144705

ED Entered STN: 01 Feb 2004

TI Nanostructures containing antibody or Ig fragment, and non-antibody joining element and functional element for nanoscale devices

IN Makowski, Lee; Williams, Mark K.; Goldberg, Edward B.

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2004018587	A1	20040129	US 2003-371067	20030221 <--
	US 5877279	A	19990302	US 1994-322760	19941013
	US 5864013	A	19990126	US 1995-542003	19951012 <--
	US 6437112	B1	20020820	US 1999-236949	19990125 <--
	US 2003198956	A1	20031023	US 2002-80608	20020221
	US 2003236390	A1	20031225	US 2002-136225	20020429 <--
PRAI	US 1994-322760	A2	19941013	<--	
	US 1995-542003	A3	19951012	<--	
	US 1999-236949	A3	19990125	<--	
	US 2002-80608	A2	20020221		
	US 2002-136225	A2	20020429		

AB Nanostructures are made that include at least one species of assembly unit that is an antibody assembly unit in which at least one joining element, structural element or functional element is an antibody or antibody fragment. Antibody assembly units may have more than one antibody element. In addition, the antibody assembly units may contain non-antibody structural, functional or joining elements. The nanostructure is suitably prepared using a staged assembly method. In this method, a nanostructure intermediate having at least one unbound joining element is contacted with an assembly unit having a plurality of different joining elements. None of the joining elements of the assembly unit can interact with itself or with another joining element of the same assembly unit. However, one of the joining elements of the assembly unit can interact with the unbound joining element of the nanostructure intermediate, so that the assembly unit is non-covalently bound to the nanostructure intermediate to form a new nanostructure intermediate for use in subsequent cycles. Unbound assembly units are removed and the cycles is repeated for a sufficient number of cycles to form a nanostructure. The assembly units in at least one cycle are antibody assembly units.

IT Biosensors

Nanotubes

Nanowires

Quantum dot devices

Semiconductor devices

Semiconductor nanostructures

L62 ANSWER 1 OF 14 HCAPLUS COPYRIGHT ACS on STN

AN 2003:485026 HCAPLUS

DN 139:59559

ED Entered STN: 25 Jun 2003

TI Amperometric biomimetic enzyme sensors based on modified cyclodextrin as electrocatalysts

IN Chen, Ellen T.

PA United States Dept. of Health and Human Services, USA

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6582583	B1	20030624	US 1999-451141	19991130 <--
US 1998-110470P	P	19981130	<--	

PI US 6582583 B1 20030624 US 1999-451141 19991130 <--

PRAI US 1998-110470P P 19981130 <--

AB The present invention provides a novel **biosensor** for the detection of chems. of interest. The novel **biosensor** of the present invention comprises an electrode having a catalytically active cyclodextrin attached thereto. The present invention will be useful for the detection of materials in a wide variety of samples. In particular, the present invention will permit the detection of nitrophenyl esters.

ST **biosensor** enzyme cyclodextrin deriv electrocatalyst phenol

IT **Biosensors**
(amperometric biomimetic enzyme sensors based on modified cyclodextrin as electrocatalysts)

IT Enzymes, analysis
RL: AMX (Analytical matrix); ANST (Analytical study)
(amperometric biomimetic enzyme sensors based on modified cyclodextrin as electrocatalysts)

IT Phenols, analysis
RL: ANT (Analyte); ANST (Analytical study)
(amperometric biomimetic enzyme sensors based on modified cyclodextrin as electrocatalysts for)

IT Polyoxyalkylenes, uses
Polyoxyalkylenes, uses
RL: NUU (Other use, unclassified); USES (Uses)
(**biosensor** comprising electrode with catalytically active cyclodextrin containing)

IT **Nanotubes**
(**biosensor** comprising electrode with catalytically active cyclodextrin forming)

L32 ANSWER 5 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 2003:97136 HCAPLUS

DN 138:155821

ED Entered STN: 07 Feb 2003

TI Metal oxide having nanotube- or nanowire shape and its manufacture for solar-cell electrode and catalyst

IN Adachi, Motonari; Yoshikawa, Akira; Harada, Makoto; Murata, Yusuke

PA Japan Science and Technology Corporation, Japan

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2003034531	A2	20030207	JP 2001-150030	20010518 <--
PRAI	JP 2000-149038	A	20000519	<--	
	JP 2001-143930	A	20010514		

CLASS

AB The title metal oxide nanotube or nanowire is manufactured by mixing a metal compound or its solution containing an organic solvent, a surfactant, and water and then solidifying. Also claimed process comprises mixing a solution containing Ti alkoxide and an organic solvent with an aqueous solution containing ≤ 0.5 mol/L surfactant showing pH 2-5 and then solidifying to give a TiO₂ nanotube. Alternatively, a TiO₂ nanowire is manufactured by mixing a Ti alkoxide solution containing an organic solvent and a surfactant with water at mol ratio H₂O/Ti ≤ 2 and then solidifying. The resulting TiO₂ nanotube provides high photocatalytic activity. The resulting metal oxide nanotube or nanowire has high dye sensitizing ability and electron transporting ability. Also claimed is an electrode using the metal oxide for a dye-sensitized solar cell. The metal oxide is also suitable for a catalyst or a catalyst support.

IT Electrodes

Hydrolysis

Nanotubes

Nanowires

Photolysis catalysts

Solar cells

(metal oxide having nanotube- or nanowire shape manufactured by hydrolysis for solar-cell electrode and catalyst)

L32 ANSWER 6 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 2002:964603 HCAPLUS

DN 138:48054

ED Entered STN: 20 Dec 2002

TI Fabrication of electronic and optoelectronic devices from nanostructured thin films

IN Kalkan, Kaan A.; Fonash, Stephen J.

PA The Penn State Research Foundation, USA

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002101352	A2	20021219	WO 2002-US17909	20020606
WO 2002101352	A3	20030605		
WO 2002101352	C1	20030814		
US 2002187312	A1	20021212	US 2002-144456	20020513 <--
US 2001-296857P	P	20010608		
US 2002-104759	A	20020322		
US 2002-144456	A	20020513		
US 2000-580105	A2	20000530	<--	
US 2001-290876P	P	20010514		

AB The invention relates to the fabrication of electronic and optoelectronic devices from composites consisting of an interpenetrating network configuration of nanostructured thin films with high surface-to-volume ratios and an organic/inorg. material. The nanostructured film material is deposited onto an electrode substrate such that the nanoscale basic elements are embedded in a void matrix while having elec. connectivity with the electrode substrate. For example, the film material may consist of an array of nanoprotusions elec. connected to the electrode substrate and separated by a void matrix. The interpenetrating network is formed by introducing an appropriate organic/inorg. material into the void volume of the film material. Further electrodes are defined onto the film or intra-void material to fabricate a device. Potential devices include charge separation devices, charge injection devices, charge storage devices, field effect devices, ohmic contacts, and chemical sensors.

IT Capacitors
Optical detectors
Photoelectric devices
Photolithography

Sensors

(fabrication of electronic and optoelectronic devices from nanostructured thin films)

IT Ceramics
Nanoparticles
Nanotubes

Nanowires

(nanostructured material; fabrication of electronic and optoelectronic devices from nanostructured thin films)

7440-55-3, Gallium, uses 7440-56-4, Germanium, uses 7440-74-6, Indium,
uses 7631-86-9, Silica, uses 7782-49-2, Selenium, uses 13494-80-9,
Tellurium, uses

RL: DEV (Device component use); USES (Uses)

(nanostructured material; fabrication of electronic and optoelectronic devices from nanostructured thin films)

L58 ANSWER 2 OF 10 HCAPLUS .COPYRIGHT ACS on STN

AN 2002:107196 HCAPLUS

DN 136:147446

ED Entered STN: 10 Feb 2002

TI **Methods and kits for solid phase nanoextraction and desorption**

IN Singh, Rajendra; Cromer, Remy; Natan, Michael J.

PA Surromed, Inc., USA

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002009836	A2	20020207	WO 2001-US24191	20010801 <--
	US 6800490	B1	20041005	US 2000-688063	20001013 <--
	AU 2001078133	A5	20020213	AU 2001-78133	20010801 <--
	US 2002034827	A1	20020321	US 2001-920440	20010801 <--
PRAI	US 2000-222214P	P	20000801	<--	
	US 2000-238181P	P	20001005	<--	
	US 2000-239662P	P	20001012	<--	
	US 2000-688063	A	20001013	<--	
	US 2001-265790P	P	20010201		
	US 2001-266146P	P	20010202		
	US 2000-189151P	P	20000314	<--	
	US 2000-190247P	P	20000317	<--	
	US 2000-194616P	P	20000405	<--	
	WO 2001-US24191	W	20010801		

AB Methods for and material for separation and anal. of complex materials, including biol. materials, are discussed. Boronic acid-derivatized magnetic particles, streptavidinated particles, and carboxy-modified latex particles were used to sep. glucose, biotin-fluorescein conjugate and dioxadodecanediamine.

IT 7440-22-4, Silver, uses 7440-57-5, Gold, uses

RL: DEV (Device component use); USES (Uses)

(mercapto aminodextran coating of **nanorods** containing; methods and kits for solid-phase nanoextn. and desorption)

IT 50-99-7, D-Glucose, analysis 2321-07-5D, Fluorescein, conjugates with biotin 7300-34-7

RL: ANT (Analyte); ANST (Analytical study)

(methods and kits for solid-phase nanoextn. and desorption)

IT 13780-71-7D, Boronic acid, conjugates with magnetic particles

RL: ARG (Analytical reagent use); ANST (Analytical study); USES (Uses)

(methods and kits for solid-phase nanoextn. and desorption)

IT 50-89-5DP, Deoxythymidine, biotinylated oligomers, complexes with streptavidin nanoparticles 58-85-5DP, Biotin, conjugates with oligomer, complexes with streptavidin nanoparticles

RL: ARG (Analytical reagent use); SPN (Synthetic preparation); ANST (Analytical study); PREP (Preparation); USES (Uses)

(methods and kits for solid-phase nanoextn. and desorption)

IT 108-30-5, Succinic anhydride, reactions 2885-00-9, 1-Octadecanethiol 9013-20-1, Streptavidin 37293-51-9, Aminodextran 49594-30-1,

3-Mercapto-1-propanesulfonic acid 68181-17-9, SPDP 71310-21-9, 11-Mercaptoundecanoic acid 113630-26-5 394657-66-0

RL: RCT (Reactant); RACT (Reactant or reagent)

(methods and kits for solid-phase nanoextn. and desorption)

IT 9013-20-1DP, Streptavidin, conjugates with segmented nanoparticles

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(methods and kits for solid-phase nanoextn. and desorption)

IT 9004-54-0D, Dextran, carboxy-terminated

RL: ARU (Analytical role, unclassified); DEV (Device component use); RCT (Reactant); ANST (Analytical study); RACT (Reactant or reagent); USES (Uses)

(segmented nanoparticles coated with; methods and kits for solid-phase nanoextn. and desorption)

L58 ANSWER 3 OF 10 HCAPLUS COPYRIGHT ACS on STN
 AN 2002:72382 HCAPLUS
 DN 136:115068
 ED Entered STN: 25 Jan 2002
 TI Multimeric biopolymers as structural elements, sensors and actuators in microsystems
 IN Madou, Marc; Bachas, Leonidas G.; Daunert, Sylvia
 PA The Ohio State University Research Foundation, USA; University of Kentucky Research Foundation
 SO PCT Int. Appl., 26 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 IC ICM G01N
 CC 9-1 (Biochemical Methods)
 Section cross-reference(s): 47

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002006789	A2	20020124	WO 2001-US22224	20010713 <--
	CA 2419156	AA	20020124	CA 2001-2419156	20010713 <--
	AU 2001080552	A5	20020130	AU 2001-80552	20010713 <--
	US 2002068295	A1	20020606	US 2001-905041	20010713 <--
	EP 1301585	A2	20030416	EP 2001-958947	20010713 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
PRAI	US 2000-218036P	P	20000713	<--	
	WO 2001-US22224	W	20010713		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
------------	-------	------------------------------------

WO 2002006789	ICM	G01N
---------------	-----	------

AB Biomol. complexes hereinafter referred to as multimeric biopolymers are described which can be used as the foundation of chemical control systems capable of both sensing the presence of a target analyte and actuating some mech. response. The biomol. complexes are multimeric biopolymers comprising at least two monomeric units. The monomeric units are selected from the group consisting of full-length proteins, polypeptides, nucleic acid mols., and peptide nucleic acids. At least one of the monomeric units binds to the target analyte. In one highly preferred embodiment the multimeric biopolymers of the present invention undergo a detectable conformational change in response to exposure to an analyte. The present invention also provides micromachined and nanomachined devices and systems which employ the multimeric biopolymers to sense the presence of a target analyte, to actuate a response to the presence of a target analyte, or the perform both functions.

IT Semiconductor devices
 (microscale; multimeric biopolymers as structural elements and sensors and actuators in microsystems)

IT Films
 (multimeric biopolymer covalently bound to; multimeric biopolymers as structural elements and sensors and actuators in microsystems)

IT Actuators
 Anions
 Biosensors
 Cations
 Conducting polymers
 Drug delivery systems
 Electric potential
 Electrochemical analysis
 Fluorometry
 Microactuators
 Microarray technology
 Micromachines
 Nanomachines
 Nanotubes
 Porous materials
 Sensors
 Spectroscopy
 pH

L64 ANSWER 1 OF 5 HCAPLUS COPYRIGHT ACS on STN

AN 2001:828915 HCAPLUS

DN 135:366147

ED Entered STN: 15 Nov 2001

TI Electrochemical sensors made from conductive polymer composite materials and methods of making same

IN Foulger, Stephen H.

PA Pirelli Cables and Systems LLC, USA

SO U.S., 23 pp.

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6315956	B1	20011113	US 1999-268884	19990316
CA 2300722	AA	20000916	CA 2000-2300722	20000315 <--
PRAI US 1999-268884	A	19990316	<--	

AB An electrochem. sensor which is tailored for sensitivity to specific chemical analytes by selecting proper constituents. The electrochem. sensor is comprised of an immiscible polymer blend of at least two polymers in which a conductive filler is dispersed in one of the polymers of the blend through a multiple percolation approach to compounding. When in the presence of a chemical analyte which is in either a liquid or vapor phase, one phase of the dual immiscible polymer blend swells, effecting a decrease in the conductivity, or increase in resistivity, of the polymer blend. The electrochem. sensor is reversible in that when the chemical analyte evaps. or is removed, the polymer blend returns to its original conductivity. With the multiple percolation approach it is possible to make a single composite material identifiably sensitive to various chemical analytes by incorporating several major phase materials into the immiscible polymer blend, each having an affinity for swelling for a different analyte. Further, the multiple percolation approach allows sensors to be made at extremely low cost.

IT Antiblocking agents

Antioxidants

Conducting polymers

Coupling agents

Crosslinking agents

Crystal whiskers

Dyes

Electronic device fabrication

Fillers

Fireproofing agents

Lubricants

Nanotubes

IT 78-93-3, Methyl ethyl ketone, analysis 109-99-9, Tetrahydrofuran, analysis

RL: ANT (Analyte); ANST (Analytical study)

(fabrication of electrochem. sensors based on conductive polymer composites)

IT 7782-42-5, Graphite, uses 9002-88-4, Polyethylene

RL: ARG (Analytical reagent use); DEV (Device component use); ANST (Analytical study); USES (Uses)

(fabrication of electrochem. sensors based on conductive polymer composites)

L62 ANSWER 4 OF 14 HCAPLUS COPYRIGHT ACS on STN

AN 2001:693653 HCAPLUS

DN 135:254050

ED Entered STN: 21 Sep 2001

TI Cross-reactive **biosensor** system for liquid analytes

IN Walt, David R.; Schauer, Caroline L.; Steemers, Frank J.

PA Trustees of Tufts College, USA

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2001069245	A2	20010920	WO 2001-US8126	20010314 <--
	WO 2001069245	A3	20020502		
PRAI	US 2000-189200P	P	20000314	<--	

AB The present invention provides a novel cross-reactive sensor system utilizing cross-reactive recognition elements. In the inventive system, each of said one or more cross-reactive recognition elements is capable of interacting with more than one species of liquid analyte of interest, whereby each of said one or more cross-reactive recognition elements reacts in a different manner with each of said one or more species of liquid analytes of interest to produce a detectable agent of each analyte of interest, whereby said detectable agent is analyzed and the information is processed for data acquisition and interpretation. In certain preferred embodiments, the detectable agent and/or change is detected directly, while in certain other preferred embodiments, the detectable agent and/or change is detected with the help of a transducing agent capable of relaying information about each detectable agent generated for each of said species of liquid analyte of interest, whereby said information is processed for data acquisition and interpretation. The present invention also provides method for the anal. of analytes comprising contacting one or more analytes with the inventive system described above.

IT **Biosensors**

(acoustic plate mode; cross-reactive **biosensor** system for liquid analytes)

IT Physical properties

(adiabatic change; cross-reactive **biosensor** system for liquid analytes)

IT Receptors

RL: ARG (Analytical reagent use); ANST (Analytical study); USES (Uses)
(aza-clefts; cross-reactive **biosensor** system for liquid analytes)

IT Metacyclophanes

RL: ARG (Analytical reagent use); ANST (Analytical study); USES (Uses)
(calixarenes; cross-reactive **biosensor** system for liquid analytes)

IT Inclusion compounds

RL: ARG (Analytical reagent use); ANST (Analytical study); USES (Uses)
(carceplexes; cross-reactive **biosensor** system for liquid analytes)

IT **Sensors**

(chemo; cross-reactive **biosensor** system for liquid analytes)

IT Inclusion compounds

RL: ARG (Analytical reagent use); ANST (Analytical study); USES (Uses)
(coraplexes; cross-reactive **biosensor** system for liquid analytes)

IT Acoustic transducers

Amperometry

Biosensors

Micelles

Microtiter plates

Molecular recognition

Nanotubes

Potentiometry

Process control

SERS (Raman scattering)

Spectrometers

Spheres

Stripping potentiometry

Surface acoustic wave

Transducers

Virus

L65 ANSWER 2 OF 35 HCAPLUS COPYRIGHT ACS on STN

AN 2001:676892 HCAPLUS

DN 135:237555

ED Entered STN: 14 Sep 2001

TI Integrated nucleic acid hybridization devices for improved kinetics, sensitivity and discrimination power

IN Hogan, Michael; Powdrill, Thomas; Iverson, Bonnie; Belosludtsev, Yuri Y.; Belosludtsev, Inna Y.

PA Genometrix Genomix, Inc., USA

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001066687	A1	20010913	WO 2000-US23438	20000824 <--
US 2000-522240	A1	20000309	<--	
US 2000-636268	A1	20000810	<--	

AB The invention provides devices and methods for enhanced and selective association or binding between biol. materials, such as nucleic acids, e.g., DNA or RNA, or polypeptides, and an immobilized oligonucleotide probe. In one embodiment, the invention provides an association device comprising a plurality of nucleic acid probes or polypeptide probes or a combination thereof linked to a solid substrate. The solid substrate comprises a substrate surface comprising an external substrate surface and a plurality of internal pores, wherein the pores comprise a proximal end opening to the external surface to allow passage of fluid into a pore, and wherein the pore surfaces comprise an association surface. The association surface comprises a charged surface comprising net pos. (cationic) charge d. under conditions comprising a pH lower than the pI of the association surface. Methods for making these hybridization/association devices are also provided. Covalent and noncovalent probe immobilization methodologies are employed for surface hybridization modeling studies. Incorporating low ionic strength, low pH buffers (together with a net cationic charge d. on the device surface) as hybridization conditions provides significant increases in the kinetics, sensitivity, and discrimination power of nucleic acid-based and polypeptide-based biosensors and related hybridization techniques. For example, the devices and methods of the invention can be used in nucleic acid-based diagnostic tests. The devices and methods of the invention can be used, e.g., for detecting the association of a nucleic acid in a sample to a nucleic acid probe or purifying a nucleic acid from a sample.

ST nucleic acid hybridization device; polypeptide polynucleotide immobilization hybridization device; cationic charge density nucleic acid hybridization device

IT Spheres

(beads, porous; integrated nucleic acid hybridization devices for improved kinetics, sensitivity and discrimination power)

IT Nanotubes

RL: DEV (Device component use); USES (Uses)
(carbon, monodispersed; integrated nucleic acid hybridization devices for improved kinetics, sensitivity and discrimination power)

IT Fibers

RL: DEV (Device component use); USES (Uses)
(hollow, porous; integrated nucleic acid hybridization devices for improved kinetics, sensitivity and discrimination power)

IT DNA microarray technology

Immobilization, biochemical

Nucleic acid hybridization

(integrated nucleic acid hybridization devices for improved kinetics, sensitivity and discrimination power)

IT DNA

RNA

RL: ANT (Analyte); PEP (Physical, engineering or chemical process); ANST (Analytical study); PROC (Process)
(integrated nucleic acid hybridization devices for improved kinetics, sensitivity and discrimination power)

IT Probes (nucleic acid)

RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)

(integrated nucleic acid hybridization devices for improved kinetics, sensitivity and discrimination power)

L58 ANSWER 4 OF 10 HCAPLUS COPYRIGHT ACS on STN

AN 2001:636312 HCAPLUS

DN 135:196798

ED Entered STN: 31 Aug 2001

TI Method for obtaining macroscopic fibers and strips from colloidal particles and in particular carbon nanotubes

IN Poulin, Philippe; Vigolo, Brigitte; Penicaud, Alain; Coulon, Claude

PA Centre National de la Recherche Scientifique (C.N.R.S.), Fr.

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2001063028	A1	20010830	WO 2001-FR544	20010223 <--
	FR 2805179	A1	20010824	FR 2000-2272	20000223
	FR 2805179	B1	20020927		
	CA 2397564	AA	20010830	CA 2001-2397564	20010223 <--
	AU 2001037491	A5	20010903	AU 2001-37491	20010223 <--
	EP 1268894	A1	20030102	EP 2001-909894	20010223 <--
	BR 2001008656	A	20030429	BR 2001-8656	20010223 <--
	JP 2003524084	T2	20030812	JP 2001-561830	20010223 <--
	NO 2002003996	A	20021008	NO 2002-3996	20020822 <--
	US 2003102585	A1	20030605	US 2002-204794	20021209 <--
PRAI	FR 2000-2272	A	20000223	<--	
	WO 2001-FR544	W	20010223		

<--

AB The invention concerns a method for obtaining fibers and strips with improved elec. and mech. properties from colloidal particles such as C nanotubes, characterized in that it consists in: (1) dispersing said particles in a solvent optionally using a surfactant; (2) injecting the resulting dispersion solution through ≥1 orifice emerging into a flow of an external solution, preferably, having a higher viscosity than said dispersion, the viscosity levels being measured in the same temperature and pressure conditions, so as to cause said particles to agglomerate into fibers or strips by destabilizing the particle dispersions and optionally aligning said particles.

ST fiber manuf carbon nanotube surfactant; extrusion colloidal particle dispersion fiber manuf

IT Sensors

(chemical; obtaining macroscopic fibers and strips by extrusion of dispersions of colloidal particles such as carbon nanotubes for chemical detectors)

IT Semiconductor materials

(obtaining macroscopic fibers and strips by extrusion of dispersions of colloidal particles such as carbon nanotubes for semiconductive materials)

IT 9002-89-5, Polyvinyl alcohol 9004-34-6, Cellulose, uses

RL: NUU (Other use, unclassified); USES (Uses)

(in obtaining macroscopic fibers and strips by extrusion of dispersions of colloidal particles such as carbon nanotubes)

RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Akzo Nobel Uk Limited; WO 9936604 A 1999 HCAPLUS
- (2) Andrews, R; APPLIED PHYSICS LETTERS 1999, V75(9) HCAPLUS
- (3) Sfec; FR 2088130 A 1972 HCAPLUS
- (4) The Carborundum Company; GB 1174959 A 1969 HCAPLUS

L58 ANSWER 5 OF 10 HCAPLUS COPYRIGHT ACS on STN
 AN 2001:453349 HCAPLUS
 DN 135:40137
 ED Entered STN: 22 Jun 2001
 TI Carbon **nanotube** devices
 IN Dai, Hongjie; Kong, Jing
 PA Board of Trustees of the Leland Stanford Junior University, USA
 SO PCT Int. Appl., 33 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 IC ICM G01N027-12
 CC 79-2 (Inorganic Analytical Chemistry)
 Section cross-reference(s): 9, 80

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2001044796	A1	20010621	WO 2000-US42186	20001115 <--
	WO 2001044796	C2	20030130		
	US 6528020	B1	20030304	US 2000-574393	20000519 <--
	EP 1247089	A1	20021009	EP 2000-992511	20001115 <--
	JP 2003517604	T2	20030527	JP 2001-545835	20001115 <--
	US 2003068432	A1	20030410	US 2002-299610	20021118 <--
PRAI	US 1999-171200P	P	19991215	<--	
	US 1998-133948	A3	19980814	<--	
	US 2000-574393	A3	20000519	<--	
	WO 2000-US42186	W	20001115	<--	

AB This invention provides an assembly of novel **nanotube** devices that can be employed in a variety of applications. In particular, the **nanotube** devices of the present invention provide a new class of versatile **chemical and biol. sensors**. The present invention describes methods for growing individual **nanotubes** in a controlled fashion and for manipulating and integrating the **nanotubes** into functional devices. It further provides methods for modifying the **nanotubes** such that their sensitivity to a wide range of chemical and biol. species can be achieved.

IT **Nanotubes**

RL: ARU (Analytical role, unclassified); DEV (Device component use); ANST
 (Analytical study); USES (Uses)
 (carbon; design, fabrication and operation of **nanotube** based
 sensors and **biosensors**)

IT **Biosensors**

Dopants
 Electric conductors
 Electric contacts
 Films
 Nanoparticles
Nanotubes
 Resists
 Semiconductor device fabrication
 Semiconductor materials
 Sensors
 (design, fabrication and operation of **nanotube** based sensors
 and **biosensors**)

IT Enzymes, uses

Thiols (organic), uses
 RL: ARG (Analytical reagent use); DEV (Device component use); ANST
 (Analytical study); USES (Uses)
 (design, fabrication and operation of **nanotube** based sensors
 and **biosensors**)

IT Oxides (inorganic), analysis

RL: ARU (Analytical role, unclassified); DEV (Device component use); ANST
 (Analytical study); USES (Uses)
 (design, fabrication and operation of **nanotube** based sensors
 and **biosensors**)

IT Hydrocarbons, processes

RL: PEP (Physical, engineering or chemical process); PROC (Process)
 (design, fabrication and operation of **nanotube** based sensors and **biosensors**)

L32 ANSWER 12 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 2001:281627 HCAPLUS
 DN 135:39344
 ED Entered STN: 20 Apr 2001
 TI Coulomb blockade in single tunnel junction connected to nanowire
 and carbon nanotube
 AU Haruyama, J.; Takesue, I.; Sato, Y.; Hijioaka, K.
 CS Dept. Electrical Engineering and Electronics, Aoyama Gakuin University,
 Tokyo, 157-8572, Japan
 SO NATO Science Series, Series C: Mathematical and Physical Sciences (2000),
 559(Quantum Mesoscopic Phenomena and Mesoscopic Devices in
 Microelectronics), 145-160
 CODEN: NSCMFG; ISSN: 1389-2185
 PB Kluwer Academic Publishers
 DT Journal
 LA English
 CC 76-3 (Electric Phenomena)
 Section cross-reference(s): 77
 AB It is well known that Coulomb blockade (CB) in single tunnel junction (STJ) system strongly
 depends on its external electromagnetic environment (EME), so called phase correlation theory.
 Tunneling electron can transfer its charging energy E_c to the EME and charges on junction
 surface can be isolated from external phase fluctuation, only when the impedance of EME is
 larger than resistance quantum ($R_Q = h/e^2 \approx 25.8 \text{ k}\Omega$). It is quite interesting condition
 because of pure requirement from quantum mechanics. Here, some mesoscopic phenomena can also
 yield high impedance. In this work, we connect STJ directly to Ni nanowire and multi-walled C
 nanotube (MWNT). It is, for the 1st time, confirmed that mutual Coulomb interaction (MCI) in
 the Ni wire and weak localization (WL) in the MWNT can play the role of high impedance EME of
 CB. The CB is very sensitive to phase fluctuation of EME.
 ST tunnel junction aluminum alumina nickel nanowire Coulomb
 blockade; carbon nanotube aluminum alumina tunnel junction Coulomb
 blockade
 IT Coulomb blockade
 Nanowires (metallic)
 Tunnel junctions
 (Coulomb blockade in Al/Al₂O₃ single tunnel junction connected to Ni
 nanowire and multiwalled C nanotube)
 IT Electric impedance
 (Coulomb blockade in Al/Al₂O₃ single tunnel junction connected to Ni
 nanowire and multiwalled C nanotube yielding high)
 IT Nanotubes
 RL: PEP (Physical, engineering or chemical process); PRP (Properties);
 PROC (Process)
 (carbon, multiwalled; Coulomb blockade in Al/Al₂O₃ single tunnel
 junction connected to Ni nanowire and multiwalled C nanotube)
 IT Magnetic field effects
 (magnetic field dependence of impedance of Al/Al₂O₃ single tunnel
 junction connected to Ni nanowire and multiwalled C nanotube)
 IT 1344-28-1, Alumina, properties 7429-90-5, Aluminum, properties
 7440-02-0, Nickel, properties 7440-44-0, Carbon, properties
 RL: PEP (Physical, engineering or chemical process); PRP (Properties);
 PROC (Process)
 (Coulomb blockade in Al/Al₂O₃ single tunnel junction connected to Ni
 nanowire and multiwalled C nanotube)

RE.CNT 33 THERE ARE 33 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Abrahams, E; Phys Rev Lett 1979, V42, P673
- (2) Altshuler, B; Electron-electron Interactions in Disordered Systems 1985
- (3) Altshuler, B; J Phys C 1982, V15, P7367 HCAPLUS
- (4) Altshuler, B; Solid State Comm 1979, V30, P115 HCAPLUS
- (5) Anderson, P; Phys Rev 1958, V109, P1492 HCAPLUS
- (6) Averin, D; Mesoscopic Phenomena in Solids 1991, P173
- (7) Averin, D; Single Charge Tunneling 1991
- (8) Bachtold, A; Nature 1999, V397, P673 HCAPLUS
- (9) Cleland, A; Phys Rev Lett 1990, V64, P1565
- (10) Davydov, D; Phys Rev B 1998, V57, P13550 HCAPLUS
- (11) Delsing, P; Phys Rev Lett 1989, V63, P1180 HCAPLUS

(L32 ANSWER 13 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 2001:217673 HCAPLUS

ED Entered STN: 28 Mar 2001

TI Tactile sensor comprising nanowires and method for making the same

IN Jin, Sungho

PA Lucent Technologies Inc., USA

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1087413	A2	20010328	EP 2000-307853	20000911 <--
EP 1087413	A3	20021002		
PRAI US 1999-405641	A	19990924	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 1087413	ICM	H01H001-06
	ICS	H01H003-16; H01H001-00
EP 1087413	ECLA	H01H001/00M; H01H001/06

AB A tactile sensor device is disclosed that can be used for high resolution tactile sensing. The sensor may be used as a tactile shear sensor. It comprises a circuit substrate; an array of contact pads on the circuit substrate, and a set of nanowires attached to each of the contact pads. The contact pads may be isolated or formed from a matrix of interconnecting strips of material. Each set of nanowires comprises at least one and preferably a plurality of nanowires that are desirably vertically aligned and equal in length. When an object contacts at least one of the plurality of sets of nanowires, it causes at least one set of nanowires to bend and make contact along a portion of the length thereof with at least another set of nanowires. The position and movement activity of the object can be sensed by elec. interrogating pairs of contact pads to determine whether a connection has been made between them.

L32 ANSWER 14 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 2001:186063 HCAPLUS
 DN 134:201658
 ED Entered STN: 16 Mar 2001
 TI Strongly textured atomic ridges and dots in a MOSFET device
 IN Kendall, Don; Gutttag, Mark
 PA Starmega Corporation, USA

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001018866	A1	20010315	WO 2000-US24815	20000908 <--
JP 2001523049	T2	20011120	JP 2000-519926	19981109 <--
US 6667492	B1	20031223	US 1998-187730	19981109 <--
US 6413880	B1	20020702	US 2000-657533	20000908 <--
EP 1221179	A1	20020710	EP 2000-966708	20000908 <--
US 6465782	B1	20021015	US 2000-658878	20000908 <--
US 6509619	B1	20030121	US 2000-658599	20000908 <--
US 2004061103	A1	20040401	US 2003-673378	20030930 <--
PRAI US 1997-65082P	P	19971110	<--	
US 1999-153088P	P	19990910	<--	
US 1998-187730	A	19981109	<--	
WO 1998-US23875	W	19981109	<--	
WO 2000-US24815	W	20000908	<--	

AB The present invention provides a MOSFET device comprising: a substrate including a plurality of atomic ridges, each of the atomic ridges including a semiconductor layer comprising Si and a dielec. layer comprising a Si compound; a plurality nanogrooves between the atomic ridges; ≥ 1 elongated mol. located in ≥ 1 of the nanogrooves; a porous gate layer located on top of the plurality of atomic ridges. The present invention also provides a membrane comprising: a substrate; and a plurality of nanowindows in the substrate and a method for forming nanowindows in a substrate. The present invention also provides a multi-tip array device comprising: a substrate; a multi-tip array of atomic tips on the substrate, the multi-tip array having a pitch of 0.94-5.4 nm between adjacent tips in ≥ 1 direction; and means for moving the substrate. The present invention also provides an atomic claw comprising: a mounting block; a paddle having a multi-tip array thereon, the multi-tip array having a pitch of 0.94-5.4 nm between adjacent tips in ≥ 1 direction; and a cantilever connected to the paddle and the mounting block, in which the cantilever allows the paddle to be moved in ≥ 1 arcuate direction.

IT **Nanowires** (metallic)
 (gold, silver; strongly textured atomic ridges and dots in a nanostructured MOSFET device)

IT DNA
 Peptides, uses
 RNA

RL: NUU (Other use, unclassified); USES (Uses)
 (long chain mols.; strongly textured atomic ridges and dots in a nanostructured MOSFET device)

IT Cantilevers (components)

Sensors
 (strongly textured atomic ridges and dots in a nanostructured MOSFET device)

10102-44-0, Nitrogen oxide (NO2), analysis

RL: ANT (Analyte); ANST (Analytical study)
 (detection by nanotubes; strongly textured atomic ridges and dots in a nanostructured MOSFET device)

L62 ANSWER 5 OF 14 HCAPLUS COPYRIGHT ACS on STN

AN 2001:168012 HCAPLUS

DN 134:221448

ED Entered STN: 09 Mar 2001

TI Antibodies specific for fullerenes

IN Erlanger, Bernard F.; Chen, Bi-Xing

PA The Trustees of Columbia University in the City of New York, USA

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001016155	A1	20010308	WO 2000-US23629	20000829 <--
US 6593137	B1	20030715	US 1999-386658	19990831
CA 2383015	AA	20010308	CA 2000-2383015	20000829 <--
EP 1218396	A1	20020703	EP 2000-957880	20000829 <--
EP 1218396	B1	20040922		
JP 2003508035	T2	20030304	JP 2001-519717	20000829 <--
AT 277083	E	20041015	AT 2000-957880	20000829 <--
PRAI US 1999-386658	A	19990831 <--		
WO 2000-US23629	W	20000829 <--		

AB This invention provides antibodies specific for a fullerene or derivative thereof, a **single-walled fullerene nanotube**, and a **multi-walled fullerene nanotube**, wherein the fullerene is selected from the group consisting of a fullerene carbon compound having from 20 to 540 carbon atoms. The antibodies may be monoclonal or polyclonal antibodies. This invention provides a hybridoma produced by the fusion of a mouse antibody-producing cell and a mouse myeloma which is designated 1-10F-8A and deposited with the ATCC under Accession Number PTA-279, said hybridoma producing a monoclonal antibody which binds to fullerene C60. This invention provides a mouse monoclonal antibody specific for a fullerene-C60 and produced by the mouse monoclonal antibody-producing hybridoma designated 1-10F-8A. This invention also provides methods of determining a serum concentration of a fullerene in a subject and of purifying a fullerene from a sample. This invention provides methods of preparing nanoscale devices which comprise manipulating a single-walled or a multi-walled fullerene **nanotube(s)** with the above-described antibodies specific for single-walled or multi-walled fullerene **nanotubes** to assemble electronic or chemical components of the nanoscale device.

IT Immunoglobulins

RL: ARG (Analytical reagent use); BPN (Biosynthetic preparation); BSU (Biological study, unclassified); PRP (Properties); THU (Therapeutic use); ANST (Analytical study); BIOL (Biological study); PREP (Preparation); USES (Uses)

(G; antibodies specific for fullerenes)

IT Blood serum

Chemiluminescent substances

DNA sequences

Dyes

Fluorescent substances

Hybridoma

Immunoassay

Labels

Protein sequences

(antibodies specific for fullerenes)

IT Antibodies

RL: BPN (Biosynthetic preparation); BSU (Biological study, unclassified); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)

(antibodies specific for fullerenes)

IT Fullerenes

RL: BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PROC (Process)

(antibodies specific for fullerenes)

IT Immunoglobulins

RL: ARG (Analytical reagent use); BPN (Biosynthetic preparation); BSU (Biological study, unclassified); PRP (Properties); THU (Therapeutic use); ANST (Analytical study); BIOL (Biological study); PREP (Preparation); USES (Uses)

(heavy chains; antibodies specific for fullerenes)

IT Immunoglobulins

RL: ARG (Analytical reagent use); BPN (Biosynthetic preparation); BSU

IT Analytical apparatus

(nanoscale device; antibodies specific for fullerenes)

IT Biosensors

Electric apparatus

Optical instruments

(nanoscale; antibodies specific for fullerenes)

L65 ANSWER 3 OF 35 HCAPLUS COPYRIGHT ACS on STN

AN 2000:798080 HCAPLUS
ED Entered STN: 14 Nov 2000
TI DNA conformation switching using a templated conducting polymer.
AU Nagarajan, Ramaswamy; Tripathy, Sukant K.; Kumar, Jayant; Bruno, Ferdinandó F.; Samuelson, Lynne
CS Department of Chemistry, Center for Advanced Materials, University of Massachusetts, Lowell, MA, 01854, USA
SO Abstracts of Papers, 220th ACS National Meeting, Washington, DC, United States, August 20-24, 2000 (2000) PMSE-311
CODEN: 69FZC3
PB American Chemical Society
DT Journal; Meeting Abstract
LA English
AB DNA has been used as a biol. template for the enzymic synthesis of conducting polyaniline. Template (polyelectrolyte) assisted, enzymic synthetic approach has yielded a water-soluble and conducting complex of polyaniline and the template used. The mild and near neutral pH conditions of this enzymic approach are unique and allow for the use of DNA as the polyelectrolyte to form an electro-responsive DNA/polyaniline mol. complex. UV-Vis and CD spectroscopy confirm that the polyaniline macromols. formed mimic the DNA template contour. The secondary structure of the DNA may in turn be reversibly controlled through the redox state of the polyaniline. These studies suggest new opportunities towards the development of DNA based **nano-wires, biosensors** and diagnostic tools.

L64 ANSWER 2 OF 5 HCAPLUS COPYRIGHT ACS on STN

AN 2000:798006 HCAPLUS

ED Entered STN: 14 Nov 2000

TI Elaboration of conducting polymer nanostructures: Applications as responsive materials in gas **sensors** and **biosensors**.

AU Demoustier-Champagne, Sophie M.; Stavaux, Pierre-Yves; Delvaux, Marc

CS Department of Materials, Universite catholique de Louvain, Louvain-la-Neuve, B-1348, Belg.

SO Abstracts of Papers, 220th ACS National Meeting, Washington, DC, United States, August 20-24, 2000 (2000) PMSE-240
CODEN: 69FZC3

PB American Chemical Society

DT Journal; Meeting Abstract

LA English

AB The use of nanoporous particle track-etched membranes (nano-PTM) as templates for the preparation of perfectly cylindrical and very smooth conducting polymer **nanotubes** has been considered. Chemical and electrochem. processes allowing the deposition of conducting polymers within the pores of nano-PTM have been developed and optimized. Electrodeposition has several advantages over chemical deposition process. In particular, it allows an easy control of the growth rate and of the **nanotubes** length and it offers the possibility of immobilizing enzymes in a one-step procedure during the electrochem. deposition of the conducting polymers within the pores of the template. Compared to the existing sensors based on conducting polymer films, electroactive polymer **nanotubes** provide a larger surface area per unit volume and present enhanced elec. conductivity with respect to the bulk form (2 orders of magnitude for narrow **nanotubes**). These properties can lead to an enhancement of the sensibility of gas sensors and **biosensors**.

L65 ANSWER 4 OF 35 HCAPLUS COPYRIGHT ACS on STN

AN 2000:795406 HCAPLUS
ED Entered STN: 14 Nov 2000
TI Quantative determination of functional groups on chemical modified carbon nanotube.
AU Sun, Yi; Wilson, Stephen R.
CS Department of Chemistry, New York University, New York, NY, 10003, USA
SO Abstracts of Papers, 220th ACS National Meeting, Washington, DC, United States, August 20-24, 2000 (2000) IEC-156
CODEN: 69FZC3
PB American Chemical Society
DT Journal; Meeting Abstract
LA English
AB Because of their unique electronic and mech. properties, carbon nanotubes have proved to be important new materials and may find application in many fields-- from microelectronic devices to chem. probes. The chemical modification of carbon nanotubes is important in tailoring their properties and many applications are expected to derive from functionalized carbon nanotubes. However, quantative determination of functional groups on chemical modified carbon nanotubes has not well established. Herein, a quantative method was developed to determine the active amine groups on the surface of functionalized carbon nanotube. A novel hybrid of amine-derived carbon nanotube and 9-fluorenylmethyloxycarbonyl (Fmoc) has been constructed. Subsequent cleavage of Fmoc group from above hybrid by piperidine can release Fmoc-piperidine adduct, which can be measured quntatively by UV spectra. This method has provided us a rapid, accurate and quantative way to determine active amine groups on carbon nanotube .

13/9/1
 DIALOG(R)File 94:JICST-EPlus
 (c) Japan Science and Tech Corp(JST). All rts. reserv.

05206985 JICST ACCESSION NUMBER: 02A0411622 FILE SEGMENT: JICST-E
 Advanced microstructure and magnetism controls of alloy cluster aggregates
 for creating cluster-based advanced materials.

SUMIYAMA KENJI (1)

(1) Nagoya Inst. of Technol.

Kyokugen Kankyo Jotai ni okeru Gensho Shinpojiumu. Koen Yoshishu. Heisei
 12nen, 2000, PAGE.5-8, FIG.4

JOURNAL NUMBER: N20020693P

UNIVERSAL DECIMAL CLASSIFICATION: 539.18/.19CLUSTER 537.6 548.5.07

LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan

DOCUMENT TYPE: Conference Proceeding

ARTICLE TYPE: Commentary

MEDIA TYPE: Printed Publication

ABSTRACT: The investigation is conducted for creating advanced materials from clusters of the uniform size of nanometer order. Typical results obtained are explained. 1) Mono-dispersed clusters of metals and alloys are produced with an experimental apparatus that is to deposit condensed clusters in plasma and gas consisting of a metal evaporation method by sputtering, and a cooling and condensation process with rare gas. 2) Cadmium selenide cluster is prepared by an inverse micelle method. The size selectivity of the process is enhanced by liquid chromatographic studies. The background theory is studied, namely, a growth process in one direction of metallic atoms in the cluster forming apparatus is simulated by considering collisions of the metallic atoms with other metallic atoms, rare gas atoms and the internal wall of the apparatus. 3) The first principle calculation is conducted for validating the stability of the magic numbers that are obtained by observing the clusters prepared by the methods mentioned above. 4) The basic properties are explained. Various applications of the clusters and aggregates are present in many fields. The magnetic transition of cobalt clusters at room temperature from a super paramagnetic state/a ferromagnetic state is an example for metallic clusters. An improvement of magnetic anisotropy by alloying is expected. The magnetic resistance effect is expected in the composite materials of cobalt/cobalt oxide. The clusters can be expected to be applied to magnetic sensors and gas sensors. 5) One of the applications of semiconductor and oxide clusters is the controls of the size and shape by changing the adsorbed amount and species of surface active agents on growing cluster surfaces and controls of the species and amounts of the agents introduced into the systems. 6) The photocatalytic effect (hydrogen gas generation) of sulfide semiconductor nano-clusters is explained.

DESCRIPTORS: cobalt; microcluster; cobalt oxide; nanostructure; magnetic transition; crystal growth; semiconductor material; magnetoresistance effect; cadmium selenide; sputtering; gas evaporation method; silicon carbide; iodide; nitrate(salt); hydrogen evolution reaction; cadmium sulfide; zinc sulfide; silicon; reverse micelle; plasma application; superparamagnetism; ferromagnetism; magnetic recording material; magnetic anisotropy; lead compound; fullerene C60; gold; cluster formation; photocatalytic reaction; cluster; growth

IDENTIFIERS: metallic cluster; cluster growth

BROADER DESCRIPTORS: fourth row element; element; iron group element; transition metal; metallic element; metal oxide; oxide; chalcogenide; oxygen group element compound; oxygen compound; cobalt compound; iron group element compound; transition metal compound; structure; magnetic property; phase transition; electric material; material; galvanomagnetic effect; magnetic field effect; effect; cadmium compound; 2B group element compound; selenide(chalcogenide); selenium compound; setting(solidification); silicon compound; carbon group element compound; carbide; carbon compound; halide; halogen compound; iodine compound; nitrogen oxoate; oxoate; nitrogen compound; nitrogen group element compound; chemical reaction; sulfide(chalcogenide); sulfur compound; zinc compound; third row element; carbon group element; micelle; utilization; magnetism; recording material; magnetic material; anisotropy; property; fullerene; molecular cluster; molecule; carbon; second row element; 1B group element; phenomenon; photochemical reaction; catalytic reaction

CLASSIFICATION CODE(S): BH090300; BM06010M; BK13020B

13/9/3

DIALOG(R)File 94:JICST-EPlus

(c) Japan Science and Tech Corp(JST). All rts. reserv.

04541121 JICST ACCESSION NUMBER: 00A0154454 FILE SEGMENT: JICST-E

Fluorescence-label of biomolecules using semiconductor nano fine particles.

YAMANA KAZUSHIGE (1)

(1) Himeji Inst. of Technol.

Kagaku(Chemistry), 2000, VOL.55,NO.1, PAGE.72-73, FIG.5, REF.6

JOURNAL NUMBER: F0095AAJ ISSN NO: 0451-1964 CODEN: KAKYA

UNIVERSAL DECIMAL CLASSIFICATION: 543-4

LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan

DOCUMENT TYPE: Journal

ARTICLE TYPE: Commentary

MEDIA TYPE: Printed Publication

ABSTRACT: This paper explains the titled particle (I) technology on the following items: 1) Features of luminescence characteristics, useful as **fluorescence detection systems**, 2) core-shell type CdSe-ZnS fine semiconductor particles covered with ZnS having higher band gap, followed by chemical modification or covalently bonding with protein or DNA, along with the application as a fluorescence probe for biomolecules, 3) applications to cell inside; observation of nucleus of mouse fibroblast, actin filaments and nuclear membranes by two chemically modified semiconductor fine particles with different size and 4) incorporation of semiconductor particles modified with transferrin into HeLa cells by endocytosis via receptor bonds.

DESCRIPTORS: ultrafine particle; fluorescent labeling; semiconductor; cadmium selenide; zinc sulfide; endocytosis; forbidden band; HeLa cell; fibroblast; transferrin; urea compound; carboxylic acid; nitrogen heterocyclic compound; coenzyme; sulfur heterocyclic compound

IDENTIFIERS: nanoparticle

BROADER DESCRIPTORS: fine particle; particle; labeling method; cadmium compound; 2B group element compound; transition metal compound; selenide(chalcogenide); chalcogenide; oxygen group element compound; selenium compound; zinc compound; sulfide(chalcogenide); sulfur compound; cell physiology; energy gap; band structure; energy level; tumor cell; idioblast; cell(cytology); cultured cell; blast cell; blood protein; blood component; component; animal protein; protein; chromoprotein; heterocyclic compound

CLASSIFICATION CODE(S): CC02030D

L65 ANSWER 5 OF 35 HCAPLUS COPYRIGHT ACS on STN

AN 2000:795398 HCAPLUS
ED Entered STN: 14 Nov 2000
TI Chemical modification of carbon **nanotube** sidewalls: Quantum chemistry calculations and molecular simulations.
AU Jaffe, Richard L.
CS Computational Chemistry Branch, NASA Ames Research Center, Moffett Field, CA, 94035, USA
SO Abstracts of Papers, 220th ACS National Meeting, Washington, DC, United States, August 20-24, 2000 (2000) IEC-148
CODEN: 69FZC3
PB American Chemical Society
DT Journal; Meeting Abstract
LA English
AB The remarkable properties of carbon **nanotubes** make them attractive candidates for nanostructured materials, mol.-scale electronic devices and biol., **chemical** and mech. **sensors**. However, many concepts for utilizing **nanotubes** for these applications require chemical modification of the sidewall to increase solubility, promote self-assembly and to enhance the elec. response of the device or sensor. We have studied likely approaches to chemical modification of **nanotube** sidewalls using quantum chemical calcns. to identify stable products and reaction pathways with modest activation barriers. We have also carried out mol. mechanics and dynamics simulations of functionalized **nanotubes** to assess the changes that occur in mech. and electronic properties. Results for fluorinated and methylated carbon **nanotubes** will be presented along with results for several hypothetical cycloaddn. reactions.

L32 ANSWER 15 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 2000:795269 HCAPLUS
ED Entered STN: 14 Nov 2000
TI Self assembling and nanostructured materials through supramolecular chemistry.
AU Stupp, Samuel I.
CS Materials Science, Chemistry, Medicine, Northwestern University, Evanston, IL, 60208, USA
SO Abstracts of Papers, 220th ACS National Meeting, Washington, DC, United States, August 20-24, 2000 (2000) IEC-020
CODEN: 69FZC3
PB American Chemical Society
DT Journal; Meeting Abstract
LA English
AB Learning how to program organic mols. for self assembly into nanostructures with specific shapes and chemical maps on their surfaces is of critical importance in nanotechnol. and in the development of advanced materials. Zero-dimensional objects of low symmetry shapes could pack lattices with large periodicities and cavities with useful functions such as sensing, catalysis, selective transport, templating, and bioactivity. As individual nanostructures they could be used to modify the surfaces and bulk properties of known materials, build nanoscale devices, and change the behavior of cells through targeted interactions. One-dimensional nanostructures having any desired chemical structure are also an important target to template nanowires, reinforce polymers, and interconnect cells. This lecture will describe examples of 0D and 1D structures formed by a toolbox of triblock mols. having rodcoil and dendron rodcoil architecture. The examples to be described include, 10 nm wide ribbons which transform polymeric glasses and rubbers into ordered structures, and also template **semiconducting nanowires**, as well as amphiphilic and fluorescent aggregates that travel to the nuclei of cells and could therefore be extremely useful in bioengineering.

L32 ANSWER 16 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 2000:794431 HCAPLUS

ED Entered STN: 14 Nov 2000

TI Direct measurement of the conductance of single conducting polymer nanowire and its application in biological nanosensor.

AU He, H. X.; Li, C. Z.; Tao, N. J.

CS Department of Physics, Florida International University, Miami, FL, 33199, USA

SO Abstracts of Papers, 220th ACS National Meeting, Washington, DC, United States, August 20-24, 2000 (2000) COLL-239
CODEN: 69FZC3

PB American Chemical Society

DT Journal; Meeting Abstract

LA English

AB The conductance of a single conducting polymer nanowire has been directly measured, for the first time, using scanning tunneling microscope (STM) setup. The experiment takes advantage of STM for picoampere current detection and Angstrom-level position control. In the experiment, the STM tip was held at a certain distance from an Au substrate while polyaniline was electrochem. deposited from aniline monomer solution onto the tip and substrate until a bridge was formed between. When bridged, we observed a sharp increase of current at the electrochem. potential where polyaniline is of highest conductivity. After bridging, the Au substrate was pulled away using a DC motor and the current was simultaneously monitored. As the Au substrate retracts, the cross-section of the polyaniline bridge decreases down to nanometer scale as the length increases. At the very beginning, the current fluctuates and then decreases in a stepwise fashion until the nanowire finally breaks up. The mechanism of the conductance change upon elongation will be discussed. The potential of the conducting polymer nanowire as a biol. nanosensor will also be discussed.

L32 ANSWER 17 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 2000:724406 HCAPLUS

DN 134:12599

ED Entered STN: 13 Oct 2000

TI Microwires coated by glass: a new family of soft and hard magnetic materials

AU Zhukov, A.; Gonzalez, J.; Blanco, J. M.; Vazquez, M.; Larin, V.

CS Donostia International Physics Center, San Sebastian, 20018, Spain

SO Journal of Materials Research (2000), 15(10), 2107-2113

CODEN: JMREEE; ISSN: 0884-2914

PB Materials Research Society

DT Journal

LA English

CC 77-8 (Magnetic Phenomena)

Section cross-reference(s): 55, 56

AB The Taylor-Ulitovski technique was employed for fabrication of tiny ferromagnetic amorphous and nanocryst. metallic wires covered by an insulating glass coating with magnetic properties of great technol. interest. A single and large Barkhausen jump was observed for microwires with pos. magnetostriction. Neg. magnetostriction microwires exhibited almost unhysteretic behavior with an easy axis transverse to the wire axis. Enhanced magnetic softness (initial permeability, μ_L , up to 14000) and giant magneto impedance (GMI) effect (up to 140% at 10 MHz) was observed in amorphous CoMnSiB microwires with nearly zero magnetostriction after adequate heat treatment. Large sensitivity of GMI and magnetic characteristics on external tensile stresses was observed. Upon heat treatment, FeSiBCuNb amorphous microwires devitrified into a nanocryst. structure with enhanced magnetic softness. The magnetic bistability was observed even after the 2nd crystallization process (increase of switching field by >2 orders of magnitude up to 5.5 kA/m). Hard magnetic materials were obtained as a result of decomposition of metastable phases in Co-Ni-Cu and Fe-Ni-Cu microwires fabricated by Taylor-Ulitovski technique when the coercivity increased up to 60 kA/m. A magnetic sensor based on the magnetic bistability was designed.

Magnetostriction

Nanowires (metallic)

(magnetic properties of amorphous and nanocryst. ferromagnetic glass coated microwires)

RE.CNT 27 THERE ARE 27 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Aragonese, P; Sens Actuators 2000, V81, P86
- (2) Arcas, J; Nanostruct Mater 1996, V7, P823 HCAPLUS
- (3) Barandiaran, J; Phys Rev 1987, V35, P5066 HCAPLUS
- (4) Baranov, S; Phys Met Metall 1989, V67, P73 HCAPLUS
- (5) Beach, R; J Appl Phys 1994, V76, P6209 HCAPLUS
- (6) Chiriac, H; Progress in Material Science 1997, V40, P333
- (7) Gonzalez, J; J Appl Phys 1991, V70, P6522 HCAPLUS
- (8) Gonzalez, J; J Magn Magn Mater 1990, V87, P111
- (9) Gonzalez, J; J Mater Sci 1995, V30, P5173 HCAPLUS
- (10) Goto, T; Trans Jpn Inst Med 1980, V21, P219 HCAPLUS
- (11) Humphrey, F; Magnetic Properties of Amorphous Metals 1987, P110
- (12) Ia Badinter, E; Cast microwire and its properties 1973, P6
- (13) Kraus, L; Czech J Phys 1976, VB26, P601 HCAPLUS
- (14) Larin, V; ES 96011993 1996
- (15) Nixdorf, J; Draht-Welt 1967, V53, P696
- (16) Panina, L; Appl Phys Lett 1994, V65, P1189 HCAPLUS
- (17) Sinnecker, E; J Magn Magn Mater 1999, V203, P54 HCAPLUS
- (18) Sinnecker, E; J Phys IV, Pr 2 1998, V8, P225
- (19) Squire, P; IEEE Trans Magn 1995, VMag-31, P1239
- (20) Taylor, G; Phys Rev 1924, V24, P655
- (21) Ulitovski, A; US 128427 1950
- (22) Vazquez, M; IEEE Trans Magn 1995, VMag-31, P1229
- (23) Vazquez, M; IEEE Trans Magn 1998, V34, P724 HCAPLUS
- (24) Vazquez, M; J Magn Magn Mater 1996, V160, P223 HCAPLUS
- (25) Velazquez, J; J Mater Res 1996, V11, P2499 HCAPLUS
- (26) Wang, K; Phys Status Solids 1997, V162, PR5 HCAPLUS
- (27) Zhukov, A; J Magn Magn Mater 1995, V151, P132 HCAPLUS

L32 ANSWER 19 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 2000:598689 HCAPLUS

DN 133:245740

ED Entered STN: 29 Aug 2000

TI Coulomb blockade in a **silicon-on-sapphire nanowire**

AU Dovinos, D.; Hasko, D. G.; Helin, Z.

CS Microelectronics Research Centre, Cavendish Laboratory, University of
Cambridge, Cambridge, CB3 0HE, UK

SO Microelectronic Engineering (2000), 53(1-4), 199-202
CODEN: MIENEF; ISSN: 0167-9317

PB Elsevier Science B.V.

DT Journal

LA English

CC 76-3 (Electric Phenomena)

AB The use of single electron devices as photon **detectors**, in the IR wavelength range, is explored. The operating mechanism uses photon assisted tunneling so that the device current in a single electron transistor (SET) with a bias voltage of less than the Coulomb gap voltage depends on the rate of interaction with the photons. Coupling between the photons and the SET requires the use of a planar antenna structure so that the greatest response is from the substrate side. The use of an IR transparent substrate, such as sapphire, is important to maximize the **detection sensitivity**. The fabrication and elec. behavior of SETs made using silicon-on-sapphire is described and the **detection** performance is predicted.

ST Coulomb blockade silicon sapphire **nanowire**

IT Optical **detectors**

(IR; coulomb blockade in a silicon-on-sapphire **nanowire**)

IT Coulomb blockade

Electric current

Nanowires (metallic)

(coulomb blockade in a silicon-on-sapphire **nanowire**)

IT Tunneling

(photon-assisted; coulomb blockade in a silicon-on-sapphire **nanowire**)

IT Transistors

(single electron; coulomb blockade in a silicon-on-sapphire **nanowire**)

IT 1317-82-4, Sapphire 7440-21-3, Silicon, uses

RL: DEV (Device component use); USES (Uses)

(coulomb blockade in a silicon-on-sapphire **nanowire**)

RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Averin, D; Single Charge Tunnelling 1992

(2) Chong, N; Appl Phys Lett 1997, V71, P1607 HCAPLUS

(3) Cristoloveanu, S; Reports on Progress in Physics 1987, V50(3), P327 HCAPLUS

(4) Fitzgerald, R; Phys Rev B 1998, V57, P9893 HCAPLUS

(5) Neukirk, D; Appl Phys Lett 1982, V40, P203

(6) Rieke, G; Detection of light from the ultraviolet to the submillimeter 1994

(7) Smith, R; Appl Phys Lett 1997, V71, P3838 HCAPLUS

L19 ANSWER 1 OF 5 HCAPLUS COPYRIGHT ACS on STN

AN 2000:598845 HCAPLUS
 DN 133:260021
 ED Entered STN: 29 Aug 2000
 TI Nanoimprint- and UV-lithography: Mix&Match process for fabrication of
 interdigitated **nanobiosensors**
 AU Montelius, L.; Heidari, B.; Graczyk, M.; Maximov, I.; Sarwe, E-L.; Ling,
 T. G. I.
 CS Div. Solid State Physics, Dept. Physics, University of Lund, Lund, S-21
 00, Swed.
 SO Microelectronic Engineering (2000), 53(1-4), 521-524
 CODEN: MIENEF; ISSN: 0167-9317
 PB Elsevier Science B.V.
 DT Journal
 LA English
 CC 76-3 (Electric Phenomena)
 Section cross-reference(s): 1
 AB A complete **nanobiosensor** structure consisting of a 200 μm + 200 μm area containing 100 nm
 sized interdigitated nanoelectrodes with varied interelectrode distances has been fabricated
 using nanoimprint lithog. (NIL) in combination with UV-lithog. The complete structure has
 been characterized with admittance spectroscopy. In the paper are discussed the needs and key
 issues for nanosensors and the capability offered by using NIL for fabrication of such
 sensors.
 ST interdigitated **nanobiosensor** nanoimprint UV lithog
 IT Photolithography
 (UV; process for fabrication of interdigitated **nanobiosensors**
 for nanoimprint- and UV-lithog.)
 IT Biosensors
 Lithography
 (process for fabrication of interdigitated **nanobiosensors** for
 nanoimprint- and UV-lithog.)
 RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD
 RE
 (1) Anon; Technology Roadmap for Nanoelectronics, <http://www.cordis.lu/esprit/sr>
 c/melari.htm 1999
 (2) Anon; To be published
 (3) Chou, S; Appl Phys Lett 1995, V67, P3114 HCAPLUS
 (4) Heidari, B; accepted for publication in J Vac Sci Techn B 1999
 (5) Montelius, L; J Vac Sci Techn A 1995, V13, P1755 HCAPLUS

L19 ANSWER 2 OF 5 HCAPLUS COPYRIGHT ACS on STN

AN 2000:590982 HCAPLUS
 DN 133:292953
 ED Entered STN: 25 Aug 2000
 TI The development of optical nanosensors for biological measurements
 AU Cullum, B. M.; Vo-Dinh, T.
 CS Advanced Monitoring Development Group, Oak Ridge National Laboratory, Oak Ridge, TN, 37831-6101, USA
 SO Trends in Biotechnology (2000), 18(9), 388-393
 CODEN: TRBIDM; ISSN: 0167-7799
 PB Elsevier Science Ltd.
 DT Journal; General Review
 LA English
 CC 9-0 (Biochemical Methods)
 AB A review with 38 refs. This article discusses and documents the basic concepts of, and developments in, the field of optical nanosensors and **nanobiosensors**. It describes the progression of this field of research from its birth up to the present, with emphasis on the techniques of sensor construction and their application to biol. systems. After a brief overview of the techniques for fabricating nanometer-sized optical fibers, we describe the various types of transducer and bioreceptor mol. presently used for nanosensor and **nanobiosensor** fabrication.
 ST optical nanosensor biol system review; biosensor nanosensor biol review
 IT Biosensors
 (nanobiosensors; development of optical nanosensors and nanobiosensors for biol. measurements)
 IT Optical sensors
 (nanosensors; development of optical nanosensors and nanobiosensors for biol. measurements)
 RE.CNT 40 THERE ARE 40 CITED REFERENCES AVAILABLE FOR THIS RECORD
 RE
 (1) Alarie, J; Anal Chim Acta 1990, V229, P169 HCAPLUS
 (2) Alarie, J; Polycyclic Aromat Compounds 1996, V8, P45 HCAPLUS
 (3) Anon; Scanning Microscopy Technology and Applications 1988, V897
 (4) Barker, S; Anal Chem 1998, V70, P100 HCAPLUS
 (5) Barker, S; Anal Chem 1998, V70, P4902 HCAPLUS
 (6) Barker, S; Anal Chem 1998, V70, P971 HCAPLUS
 (7) Betzig, E; Appl Phys Lett 1987, V51, P2088
 (8) Betzig, E; Science 1991, V251, P1468
 (9) Betzig, E; Science 1993, V262, P1422 HCAPLUS
 (10) Bui, J; J Neurosci Methods 1999, V89, P9 MEDLINE
 (11) Clark, H; Anal Chem 1999, V71, P4831 HCAPLUS
 (12) Clark, H; Anal Chem 1999, V71, P4837 HCAPLUS
 (13) Cordek, J; Anal Chem 1999, V71, P1529 HCAPLUS
 (14) Cullum, B; Anal Biochem 2000, V277, P25 HCAPLUS
 (15) Davis, J; Enzyme Microb Technol 1995, V17, P1030 HCAPLUS
 (16) Deckert, V; Anal Chem 1998, V70, P2646 HCAPLUS
 (17) Diamond, D; Principles of Chemical and Biological Sensors 1988
 (18) Durig, U; J Appl Phys 1986, V59, P3318
 (19) Harootunian, A; Appl Phys Lett 1986, V49, P674 HCAPLUS
 (20) Hoffmann, P; Ultramicroscopy 1995, V61, P165 HCAPLUS
 (21) Koronczi, I; Sens Actuat B 1998, V51, P188
 (22) Lieberman, K; Science 1990, V247, P59
 (23) McCulloch, S; IEEE Proc Optoelectron 1995, V144, P162
 (24) Munkholm, C; Anal Chem 1987, V58, P1427
 (25) Munkholm, C; J Am Chem Soc 1990, V112, P2608 HCAPLUS
 (26) Pohl, D; Advances in Optical and Electron Microscopy 1984, P1084
 (27) Pohl, D; Appl Phys Lett 1984, V44, P651
 (28) Samuel, J; Mater Lett 1994, V21, P431 HCAPLUS
 (29) Seitz, W; Anal Chem 1984, V56, P16A HCAPLUS
 (30) Song, A; Anal Chem 1997, V69, P863 HCAPLUS
 (31) Stockle, R; Appl Phys Lett 1999, V75, P160 HCAPLUS
 (32) Tan, W; Anal Chem 1992, V64, P2985 HCAPLUS
 (33) Tan, W; Anal Chem 1999, V71, P606A HCAPLUS
 (34) Tan, W; Science 1992, V258, P778 HCAPLUS
 (35) Tan, W; Sens Actuat B 1995, V28, P157
 (36) Turner, D; US 4469554 1984 HCAPLUS
 (37) Vo-Dinh, T; Fresenius J Anal Chem 2000, V366, P540 HCAPLUS

L65 ANSWER 8 OF 35 HCAPLUS COPYRIGHT ACS on STN

AN 2000:584953 HCAPLUS

DN 133:282167

ED Entered STN: 23 Aug 2000

TI Biochemical synthesis and unusual conformational switching of a molecular complex of polyaniline and DNA

AU Nagarajan, Ramaswamy; Tripathy, Sukant K.; Kumar, Jayant; Samuelson, Lynne A.; Bruno, Ferdinando F.

CS Department of Chemistry and Physics, Center for Advanced Materials, University of Massachusetts Lowell, Lowell, MA, 01854, USA

SO Materials Research Society Symposium Proceedings (2000), 600(Electroactive Polymers (EAP)), 249-254

CODEN: MRSPDH; ISSN: 0272-9172

PB Materials Research Society

DT Journal

LA English

CC 35-7 (Chemistry of Synthetic High Polymers)

Section cross-reference(s): 6, 36

AB Polyaniline (PANI) conducting polymer with unique redox tunability was prepared via template assisted, enzymic synthesis, obtaining a water-soluble and conducting complex of polyaniline and DNA used as template. The oxidative polymerization was carried out in a Thymus DNA solution in citrate buffer at pH 4 containing aniline and a catalytic amount of Horseradish peroxidase by drop-wise addition of H₂O₂ over a period of 240 s. The mild reaction conditions in this approach allow use of delicate biol. systems as template materials. The redox behavior of PANI induces reversible conformational changes in the secondary structure of DNA which prior to formation of PANI is present as the B polymorph. The DNA template provides the counterions necessary for charge compensation and maintains PANI in the doped form while the helical template induces a macro-asymmetry in PANI. Thus, CD results suggest that the secondary structure of DNA can be reversibly switched through manipulation of the redox state of polyaniline by varying the pH of the solution via addition of a solution of NaOH. The complex can be used for fabrication of nano-wires, biosensors, and diagnostic tools as well as for probing the microstructure and function of DNA.

ST polyaniline prepn DNA template redox mol complex; oxidative polymn aniline
DNA template pH reversibility; conformational switching DNA polyaniline
mol complex; enzyme catalyzed oxidative polymn polyaniline prepn

IT Conformation

Helix (conformation)

(DNA; enzyme catalyzed oxidative polymerization of aniline on DNA template to
obtain mol. complexes and redox-induced conformational switching of
DNA)

IT Conducting polymers

(enzyme catalyzed oxidative polymerization of aniline on DNA template to
obtain mol. complexes and redox-induced conformational switching of
DNA)

IT Polyanilines

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)

(enzyme catalyzed oxidative polymerization of aniline on DNA template to
obtain mol. complexes and redox-induced conformational switching of
DNA)

IT Polymerization

(oxidative; enzyme catalyzed oxidative polymerization of aniline on DNA
template to obtain mol. complexes and redox-induced conformational
switching of DNA)

IT Redox reaction

(reversible, pH induced; enzyme catalyzed oxidative polymerization of aniline
on DNA template to obtain mol. complexes and redox-induced
conformational switching of DNA)

IT DNA

RL: NUU (Other use, unclassified); PRP (Properties); USES (Uses)

(template; enzyme catalyzed oxidative polymerization of aniline on DNA
template to obtain mol. complexes and redox-induced conformational
switching of DNA)

IT Materials processing

(templates; enzyme catalyzed oxidative polymerization of aniline on DNA
template to obtain mol. complexes and redox-induced conformational
switching of DNA)

IT 25233-30-1P, Polyaniline

L62 ANSWER 6 OF 14 HCAPLUS COPYRIGHT ACS on STN

AN 2000:566200 HCAPLUS
 DN 133:232016
 ED Entered STN: 16 Aug 2000
 TI Elaboration of conducting polymer nanostructures. applications as responsive materials in **gas sensors and biosensors**
 AU Demoustier-Champagne, Sophie; Stavaux, Pierre-Yves; Delvaux, Marc
 CS Universite catholique de Louvain Unite de Physique et de Chimie des Hauts Polymeres, Louvain-la-Neuve, B-1348, Belg.
 SO Polymeric Materials Science and Engineering (2000), 83, 498
 CODEN: PMSEDG; ISSN: 0743-0515
 PB American Chemical Society
 DT Journal
 LA English
 CC 79-2 (Inorganic Analytical Chemistry)
 Section cross-reference(s): 35
 AB Chemical and electrochem. preparation of polypyrrole (PPy) and polyaniline (PANI) **nanotubes** obtained by using home-made polycarbonate nanoporous particle track-etched membranes as templates is reported. In all cases (chemical or electrochem. preparation of PPy or PANi) **nanotubes** were obtained. The tube thickness depends on the pore diameter of the template membrane and on the counter ion (for electropolymn.). An increase of conductivity was observed when the outer diameter of the tubes decreases.
 ST polypyrrole polyaniline **nanotube** electrochem sensor
 IT **Biosensors**
 Gas sensors
 (electrochem.; preparation of polypyrrole and polyaniline **nanotubes** and applications as responsive materials in gas sensors and **biosensors**)
 IT Conducting polymers
Nanotubes
 (preparation of polypyrrole and polyaniline **nanotubes** and applications as responsive materials in gas sensors and **biosensors**)
 IT Polyanilines
 RL: ARU (Analytical role, unclassified); PRP (Properties); SPN (Synthetic preparation); ANST (Analytical study); PREP (Preparation)
 (preparation of polypyrrole and polyaniline **nanotubes** and applications as responsive materials in gas sensors and **biosensors**)
 IT Pore structure
 (preparation of polypyrrole and polyaniline **nanotubes** and applications as responsive materials in gas sensors and **biosensors** in relation to)
 IT Polycarbonates, reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (preparation of polypyrrole and polyaniline **nanotubes** using)
 IT 30604-81-OP, Polypyrrole
 RL: ARU (Analytical role, unclassified); PRP (Properties); SPN (Synthetic preparation); ANST (Analytical study); PREP (Preparation)
 (preparation of polypyrrole and polyaniline **nanotubes** and applications as responsive materials in gas sensors and **biosensors**)

L32 ANSWER 21 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 2000:541196 HCAPLUS

DN 133:214772

ED Entered STN: 08 Aug 2000

TI Electronic connection to the interior of a mesoporous insulator with
nanowires of crystalline RuO₂AU Ryan, Joseph V.; Berry, Alan D.; Anderson, Michele L.; Long, Jeffrey W.;
Stroud, Rhonda M.; Cepak, Veronica M.; Browning, Valerie M.; Rollson,
Debra R.; Merzbacher, Celia I.

CS Naval Research Laboratory, Washington, DC, 20375, USA

SO Nature (London) (2000), 406(6792), 169-172

CODEN: NATUAS; ISSN: 0028-0836

PB Nature Publishing Group

DT Journal

LA English

CC 72-2 (Electrochemistry)

Section cross-reference(s): 67, 76

AB Highly porous materials such as mesoporous oxides are of technol. interest for catalytic, sensing and remediation applications: the mesopores (of size 2-50 nm) permit ingress by mols. and guests that are phys. excluded from microporous materials. Connecting the interior of porous materials with a nanoscale or 'mol.' wire would allow the direct electronic control (and monitoring) of chemical reactions and the creation of nanostructures for high-d. electronic materials. The challenge is to create an electronic pathway (i.e., a wire) within a mesoporous platform without greatly occluding its free volume and reactive surface area. Here the authors report the synthesis of an electronically conductive mesoporous composite-by the cryogenic decomposition of RuO₄-on the nanoscale network of a partially densified silica aerogel. The composite consists of a three-dimensional web of interconnected (.apprx.4-nm in diameter) crystallites of RuO₂, supported conformally on the nanoscopic silica network. The resulting monolithic (RuO₂.dblvert.SiO₂) composite retains the free volume of the aerogel and exhibits pure electronic conductivity. In addition to acting as a wired mesoporous platform, the RuO₂-wired silica aerogel behaves as a porous catalytic electrode for the oxidation of chloride to mol. chlorine.

IT Electric insulators

(electronic connection to interior of mesoporous insulator with
nanowires of crystalline RuO₂)

IT Crystallites

(of RuO₂ on nanoscale of partially densified silica aerogel)

IT Electric conductivity

(of RuO₄ in preparation of RuO₂-silica aerogel composite)

IT Aerogels

(silica; electronic connection to interior of mesoporous insulator with
nanowires of crystalline RuO₂: RuO₂-wired silica aerogel
electrocatalyst for chlorine evolution)

IT 7782-50-5, Chlorine, properties

RL: FMU (Formation, unclassified); PRP (Properties); FORM (Formation,
nonpreparative)

(RuO₂-wired silica aerogel electrocatalyst for chlorine evolution)IT 20427-56-9, Ruthenium oxide (RuO₄)

RL: RCT (Reactant); RACT (Reactant or reagent)

(cryogenic decomposition in preparation of RuO₂-silica aerogel composite)IT 12036-10-1, Ruthenium oxide (RuO₂)

RL: CAT (Catalyst use); PEP (Physical, engineering or chemical process);

PRP (Properties); PROC (Process); USES (Uses)

(electronic connection to interior of mesoporous insulator with
nanowires of crystalline RuO₂: RuO₂-wired silica aerogel
electrocatalyst for chlorine evolution)

RE.CNT 25 THERE ARE 25 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Anderson, M; to be published in Adv Eng Mater

(2) Ardizzone, S; Adv Colloid Interf Sci 1996, V64, P173 HCAPLUS

(3) Ardizzone, S; J Electrochem Soc 1982, V129, P1689 HCAPLUS

(4) Brinker, C; Sol-Gel Science: The Physics and Chemistry of Sol-Gel
Processing 1989, P503

(5) Ciesla, U; Micropor Mesapor Mater 1999, V27, P131 HCAPLUS

(6) Cross, J; J Phys 1989, V50, PC4185

(7) Gaylarde, P; Science 1968, V161, P1157 HCAPLUS

L65 ANSWER 9 OF 35 HCAPLUS COPYRIGHT ACS on STN

AN 2000:537224 HCAPLUS
 DN 133:257167
 ED Entered STN: 06 Aug 2000
 TI Chemical and biological applications of porous silicon technology
 AU Stewart, Michael P.; Buriak, Jillian M.
 CS Department of Chemistry, Purdue University, West Lafayette, IN,
 47907-1393, USA
 SO Advanced Materials (Weinheim, Germany) (2000), 12(12), 859-869
 CODEN: ADVMEW; ISSN: 0935-9648
 PB Wiley-VCH Verlag GmbH
 DT Journal; General Review
 LA English
 CC 66-0 (Surface Chemistry and Colloids)
 Section cross-reference(s): 6, 9, 76
 AB A review with 59 refs. describing some wet applications of **porous silicon**, including bio- and **chemical sensing**, mass spectrometry, new material supports, biocompatible materials, and in-vivo electronics. Topics discussed include: the architecture of porous silicon; the porous silicon technol. in silicon lithog.; **sensing in chemical and biol. systems**; porous silicon as support for chemical applications such as catalytic growth of carbon **nanotubes**; and porous silicon as support for biochem. reactions and proteomics.
 ST review porous silicon technol chem biol application
 IT Catalyst supports
 Lithography
 Porous materials
 Sensors
 Surface structure
 (chemical and biol. applications of porous silicon technol.)
 IT Functional groups
 (surface; chemical and biol. applications of porous silicon technol.)
 IT 7440-21-3, Silicon, uses
 RL: TEM (Technical or engineered material use); USES (Uses)
 (porous; chemical and biol. applications of porous silicon technol.)
 RE.CNT 82 THERE ARE 82 CITED REFERENCES AVAILABLE FOR THIS RECORD
 RE
 (1) Allen, M; J Lumin 1999, V80, P29
 (2) Anderson, R; J Electrochem Soc 1993, V149, P1393
 (3) Angelucci, R; Sens Actuators 1999, V74, P95
 (4) Arrand, H; IEEE Photonics, Tech Lett 1998, V10, P1467
 (5) Arrand, H; J Lumin 1999, V80, P119
 (6) Balucani, M; Solid State Phenom 1997, V54, P75 HCAPLUS
 (7) Bansal, A; J Am Chem Soc 1996, V118, P7225 HCAPLUS
 (8) Bateman, J; Angew Chem Int Ed 1998, V37, P2683 HCAPLUS
 (9) Bayliss, S; Adv Mater 1999, V11, P318 HCAPLUS
 (10) Bayliss, S; Mater World 1999, V7, P212
 (11) Bayliss, S; Sens Actuators A 1999, V74, P139
 (12) Bayliss, S; Thin Solid Films 1997, V297, P308 HCAPLUS
 (13) Ben, M; Sens Actuators 1999, V74, P123
 (14) Bogue, R; Biosens Bioelectron 1997, V12, Pxxvii
 (15) Bowditch, A; Mater Res Soc Symp Proc 1999, V536, P149 HCAPLUS
 (16) Bsiesy, A; Properties of Porous Silicon 1997, P283 HCAPLUS
 (17) Buriak, J; Chem Commun 1999, P1051 HCAPLUS
 (18) Buriak, J; J Am Chem Soc 1998, V120, P1339 HCAPLUS
 (19) Buriak, J; J Am Chem Soc 1999, V121, P11491 HCAPLUS
 (20) Canham, L; Adv Mater 1995, V7, P1033 HCAPLUS
 (21) Canham, L; Adv Mater 1999, V11, P1505 HCAPLUS
 (22) Canham, L; Appl Phys Lett 1990, V57, P1049
 (23) Cullis, A; J Appl Phys 1997, V82, P909 HCAPLUS
 (24) Curtis, C; J Electrochem Soc 1993, V140, P3492 HCAPLUS
 (25) Dancil, K; J Am Chem Soc 1999, V121, P7925 HCAPLUS
 (26) Di Francia, G; J Porous Mater 2000, V7, P287 HCAPLUS
 (27) Dillon, A; J Electrochem Soc 1992, V139, P537 HCAPLUS
 (28) Dillon, A; Surf Sci Lett 1992, V286, P535
 (29) Doan, V; Mater Res Soc Symp Proc 1993, V298, P185 HCAPLUS
 (30) Dos Santos, M; J Vac Sci Technol B 1998, V16, P2105 HCAPLUS
 (31) Drott, J; J Micromech Microeng 1997, V7, P14 HCAPLUS
 (32) Drott, J; Mikrochim Acta 1999, V131, P115 HCAPLUS

L65 ANSWER 10 OF 35 HCAPLUS COPYRIGHT ACS on STN

AN 2000:535209 HCAPLUS

DN 133:136801

ED Entered STN: 04 Aug 2000

TI Fabrication of conductive/non-conductive nanocomposites by laser evaporation

IN Chrisey, Douglas B.; McGill, R. Andrew; Pique, Alberto

PA United States Dept. of the Navy, USA

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2000044822	A2	20000803	WO 2000-US1650	20000127 <--
	AU 2000025149	A5	20000818	AU 2000-25149	20000127 <--
PRAI	US 1999-117467P	P	19990127	<--	
	WO 2000-US1650	W	20000127	<--	

AB A composite layer of a sorbent, chemoselective, non-elec.-conducting polymer and nanoparticles of an elec. conducting material dispersed throughout the polymer is formed on a substrate by pulsed laser deposition, matrix assisted pulsed laser evaporation or matrix assisted pulsed laser evaporation direct writing. The process is useful in preparation of chemical sensors.

IT Nanotubes

RL: TEM (Technical or engineered material use); USES (Uses)
(carbon; fabrication of conductive/non-conductive nanocomposites by laser evaporation)

IT Vapor deposition process

(chemical, laser-assisted, pulsed; fabrication of conductive/non-conductive nanocomposites by laser evaporation)

IT Sensors

Sorbents

(fabrication of conductive/non-conductive nanocomposites by laser evaporation)

IT Fullerenes

RL: TEM (Technical or engineered material use); USES (Uses)

(fabrication of conductive/non-conductive nanocomposites by laser evaporation)

IT Metals, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(nanoparticles; fabrication of conductive/non-conductive nanocomposites by laser evaporation)

IT 24969-06-0, Polyepichlorohydrin

RL: POF (Polymer in formulation); TEM (Technical or engineered material use); USES (Uses)

(fabrication of conductive/non-conductive nanocomposites by laser evaporation)

IT 7782-42-5, Graphite, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(particles; fabrication of conductive/non-conductive nanocomposites by laser evaporation)

L65 ANSWER 11 OF 35 HCAPLUS COPYRIGHT ACS on STN

AN 2000:460961 HCAPLUS
DN 133:142702
ED Entered STN: 09 Jul 2000
TI Controlling **nanotube** growth
AU Dai, Hongjie
CS Department of Chemistry, Stanford University, Stanford, CA, 94305, USA
SO Physics World (2000), 13(6), 43-47
CODEN: PHWOEW; ISSN: 0953-8585
PB Institute of Physics Publishing
DT Journal; General Review
LA English
CC 75-0 (Crystallography and Liquid Crystals)
Section cross-reference(s): 76, 79
AB A review with 5 refs. about C **nanotubes** from their 1st observation in 1991 to the growth of perfect single walled species by CVD. Their elec. properties are described and advantages for nanoelectromech. devices and **chemical sensors** are outlined.
ST review carbon **nanotube** CVD controlled growth; elec electromech property carbon **nanotube** CVD review; **chem sensor** carbon **nanotube** CVD review
IT **Nanotubes**
RL: ARU (Analytical role, unclassified); DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); ANST (Analytical study); PROC (Process); USES (Uses)
(carbon; controlling C **nanotube** growth by CVD, elec. characteristics, and applications as electromech devices and **chemical sensors**)
IT Vapor deposition process
(chemical; controlling C **nanotube** growth by CVD, elec. characteristics, and applications as electromech devices and **chemical sensors**)
IT Electric properties
Electromechanical effect
Gas sensors
(controlling C **nanotube** growth by CVD, elec. characteristics, and applications as electromech devices and **chemical sensors**)

L32 ANSWER 23 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 2000:510956 HCAPLUS

DN 133:213412

ED Entered STN: 28 Jul 2000

TI Electronic structures of atomic wires on a H-terminated Si(100) surface

AU Suwa, Yuji; Yajima, Akio; Tsukada, Masaru; Watanabe, Satoshi; Ichimura, Masahiko; Onogi, Toshiyuki; Hashizume, Tomihiro

CS Advanced Research Laboratory, Hitachi, Ltd., Saitama, 350-0395, Japan

SO Transactions of the Materials Research Society of Japan (1999), 24(2), 213-216

CODEN: TMRJE3; ISSN: 1382-3469

PB Materials Research Society of Japan

AB We theor. predict the atomic and electronic structures of Ga, Al, and As atomic wires, which are chemical bound to a dangling-bond wire on a H-terminated Si(100) surface, via first-principles calcs. within the local-d.-functional approach. We show the chemical trend and carrier-doping effect in the conducting properties of the atomic wires, sensitively depending on the different species and concentration of adsorbed atoms. As an intriguing byproduct, we found that the As-wire has an unusually flat (dispersion-less) energy band, where the flat band can be half-filled by electron-doping. According to so-called "flat-band ferromagnetism" theory, we show a novel possibility to create ferromagnetic nanowires, which are made up only of nonmagnetic atoms.

ST electronic structure atomic wire hydrogen terminated silicon surface calcn

IT Adsorbed substances

Band structure

Conduction electrons

Electric conductivity

Electron density

Ferromagnetism

Local density approximation

Nanostructures

Nanowires (metallic)

Surface structure

(electronic structures of atomic wires on a H-terminated Si(100) surface studied theor.)

IT 7440-21-3, Silicon, properties

RL: MSC (Miscellaneous); PRP (Properties)

(hydrogen-terminated silicon surface; electronic structures of atomic wires on a H-terminated Si(100) surface studied theor.)

IT 7429-90-5, Aluminum, properties 7440-38-2, Arsenic, properties

7440-55-3, Gallium, properties

RL: MSC (Miscellaneous); PRP (Properties)

(nanowire; electronic structures of atomic wires on a H-terminated Si(100) surface studied theor.)

RE.CNT 18 THERE ARE 18 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Anon; Proceedings of the NATO Advanced Research Workshop on Atomic and Molecular Wires 1997
- (2) Anon; Proceedings of the NATO Advanced Research Workshop on Nanowires 1997
- (3) Arita, R; Phys Rev B 1998, V57, PR6854 HCAPLUS
- (4) Eigler, D; Nature 1990, V344, P534
- (5) Hashizume, T; Jpn J Appl Phys 1996, V35, PL1085 HCAPLUS
- (6) Haye, M; Phys Rev B 1997, V56, PR1708 HCAPLUS
- (7) Hosoki, S; Appl Surf Sci 1992, V60/61, P643
- (8) Huang, D; J Vac Sci Technol 1994, VB12, P2429
- (9) Ichimura, M; Phys Rev B 1998, V58, P9595 HCAPLUS
- (10) Laasonen, K; Phys Rev B 1993, V47, P10142 HCAPLUS
- (11) Mielke, A; Commun Math Phys 1993, V158, P341
- (12) Shen, T; Phys Rev Lett 1997, V78, P1271 HCAPLUS
- (13) Tasaki, H; Prog Theor Phys 1998, V99, P489 HCAPLUS
- (14) Vanderbilt, D; Phys Rev B 1990, V41, P7892
- (15) Watanabe, S; Jpn J Appl Phys 1997, V36, PL929 HCAPLUS
- (16) Watanabe, S; Phys Rev B 1996, V54, PR17308
- (17) Yajima, A; Ph D thesis (Univ of Tokyo) 1998
- (18) Yajima, A; submitted to Phys Rev B

L19 ANSWER 3 OF 5 HCAPLUS COPYRIGHT ACS on STN

AN 2000:400461 HCAPLUS
 DN 133:204907
 ED Entered STN: 16 Jun 2000
 TI Detection of the absorption of glucose molecules by living cells using atomic force microscopy
 AU de Souza Pereira, R.
 CS Institute of Biomedical Sciences (ICB), Departamento de Parasitologia, Universidade de Sao Paulo (USP), Sao Paulo, 05508-900, Brazil
 SO FEBS Letters (2000), 475(1), 43-46
 CODEN: FEBLAL; ISSN: 0014-5793
 PB Elsevier Science B.V.
 DT Journal
 LA English
 CC 9-4 (Biochemical Methods)
 Section cross-reference(s): 6, 7, 10
 AB A very small electrode (**nanobiosensor**) was constructed by immobilizing enzyme (glucose oxidase or hexokinase) on the surface of the cantilever of the atomic force microscope in order to detect the absorption of glucose mols. by living cells. If glucose is present, the **nanobiosensor** deflects, probably due to the reaction heat evolved in the process. **Nanobiosensors** built with inactivated enzyme or cantilevers without immobilized enzyme were not capable of producing this type of signal (deflection). This technique will be very useful in detecting the passage of specific mols. through a cell wall (or a cell membrane for other types of cells).
 ST glucose absorption cell *Saccharomyces* atomic force microscopy enzyme immobilization
 IT Absorption
 Atomic force microscopy
 Biological transport
 Cantilevers (components)
 Cell
Saccharomyces cerevisiae
 (detection of absorption of glucose mols. by living cells using atomic force microscopy)
 IT Immobilization, biochemical
 (enzyme; detection of absorption of glucose mols. by living cells using atomic force microscopy)
 IT Biosensors
 (**nanobiosensor**; detection of absorption of glucose mols. by living cells using atomic force microscopy)
 IT 50-99-7, D-Glucose, analysis
 RL: ANT (Analyte); BPR (Biological process); BSU (Biological study, unclassified); PEP (Physical, engineering or chemical process); ANST (Analytical study); BIOL (Biological study); PROC (Process)
 (detection of absorption of glucose mols. by living cells using atomic force microscopy)
 IT 9001-37-0, Glucose oxidase 9001-51-8, Hexokinase
 RL: ARU (Analytical role, unclassified); BAC (Biological activity or effector, except adverse); BPR (Biological process); BSU (Biological study, unclassified); DEV (Device component use); PEP (Physical, engineering or chemical process); ANST (Analytical study); BIOL (Biological study); PROC (Process); USES (Uses)
 (detection of absorption of glucose mols. by living cells using atomic force microscopy)

RE.CNT 24 THERE ARE 24 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Binning, G; Phys Rev Lett 1986, V56, P930
- (2) Brady, D; Biotechnol Bioeng 1994, V44, P297 HCAPLUS
- (3) Brady, D; Enzyme Microb Technol 1994, V16, P633 HCAPLUS
- (4) Brady, D; Lett Appl Microbiol 1994, V18, P245 HCAPLUS
- (5) Csuk, R; Chem Rev 1991, V91, P49 HCAPLUS
- (6) Dziezak, J; Food Technol 1987, V41, P104
- (7) Ikeda, T; J Electroanal Chem 1993, V361, P221 HCAPLUS
- (8) Mogren, H; Physiol Plant 1973, V29, P82 HCAPLUS
- (9) Pereira, R; Appl Biochem Biotechnol 1995, V55, P123 HCAPLUS
- (10) Pereira, R; Appl Biochem Biotechnol 1996, V59, P135 HCAPLUS
- (11) Pereira, R; Biochem Pharmacol 1992, V44, P1795 HCAPLUS

L58 ANSWER 6 OF 10 HCAPLUS COPYRIGHT ACS on STN

AN 2000:344067 HCAPLUS

DN 132:345119

ED Entered STN: 24 May 2000

TI Multi-array, multi-specific electrochemiluminescence testing

IN Wohlstadter, Jacob N.; Wilbur, James; Sigal, George; Martin, Mark; Guo, Liang-hong; Fischer, Alan; Leland, Jon

PA Meso Scale Technologies, LLC, USA

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6066448	A	20000523	US 1996-611804	19960306 <--
	CA 2213854	AA	19960919	CA 1996-2213854	19960306 <--
	CN 1186513	A	19980701	CN 1996-193840	19960306 <--
	TW 555852	B	20031001	TW 1996-85102864	19960306 <--
	ZA 9601925	A	19970805	ZA 1996-1925	19960308 <--
	US 6207369	B1	20010327	US 1996-715163	19960917 <--
	US 6140045	A	20001031	US 1997-814085	19970306 <--
	US 6673533	B1	20040106	US 1997-932110	19970917 <--
	US 2001021534	A1	20010913	US 2001-771796	20010129 <--
	US 2004086423	A1	20040506	US 2003-693441	20031024 <--
PRAI	US 1995-402076	A2	19950310	<--	
	US 1995-402277	A2	19950310	<--	
	US 1996-12957P	P	19960306	<--	
	US 1996-611804	A2	19960306	<--	
	US 1996-715163	A2	19960917	<--	
	US 1997-932110	A3	19970917	<--	
AB	Materials and methods are provided for producing patterned multi-array, multi-sp. surfaces which are electronically excited for use in electrochemiluminescence based tests. Materials and methods are provided for the chemical and/or phys. control of conducting domains and reagent deposition for use in flat panel displays and multiply specific testing procedures. Anti-prostate specific antigen (PSA) antibody immobilized on a patterned gold electrode (preparation given) was used as an electrochemiluminescent sensor for immunoassay of PSA in serum samples.				
IT	Electric conductors				
	Electric insulators				
	Semiconductor materials				
	(as supports; patterned multi-array, multi-sp. surfaces and porous, conductive electrodes for electrochemiluminescence binding assays)				
IT	Matrix media				
	(containing carbon nanotubes or carbon black, as electrode; patterned multi-array, multi-sp. surfaces and porous, conductive electrodes for electrochemiluminescence binding assays)				
IT	Fibril				
	(electrodes; patterned multi-array, multi-sp. surfaces and porous, conductive electrodes for electrochemiluminescence binding assays)				
IT	Biosensors				
	(immunol., optical; patterned multi-array, multi-sp. surfaces and porous, conductive electrodes for electrochemiluminescence binding assays)				
IT	Biosensors				
	(immunosensors, optical; patterned multi-array, multi-sp. surfaces and porous, conductive electrodes for electrochemiluminescence binding assays)				
IT	Avidins				
IT	Antibodies				
IT	Nucleic acids				
	Prostate-specific antigen				
IT	Carcinoembryonic antigen				
	α -Fetoproteins				

L32 ANSWER 33 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 2000:330483 HCAPLUS

ED Entered STN: 19 May 2000

TI Nanomaterials: Evolving applications in membranes, energy production, and analytical chemistry.

AU Martin, Charles R.

CS Department of Chemistry, University of Florida, Gainesville, FL, 32611, USA

SO Book of Abstracts, 219th ACS National Meeting, San Francisco, CA, March 26-30, 2000 (2000), IEC-027 Publisher: American Chemical Society, Washington, D. C.

CODEN: 69CLAC

DT Conference; Meeting Abstract

LA English

AB Nanomaterials constitute one of the most exciting new frontiers in the materials sciences. We have been exploring a general method for preparing nanomaterials called "template synthesis," which entails synthesizing nanoscopic particles of the desired material within the pores of a microporous membrane or other solid. Monodisperse **nanowires**, nanofibrils or nanotubules of the desired material are obtained. In addition to exploring the fundamental phys. and chemical properties of these nanoparticles, we are developing a variety of applications. This talk will review possible new applications in membranes for **sensors** and chemical sepns. and in electrochem. energy storage and production

L56 ANSWER 1 OF 4 HCAPLUS COPYRIGHT ACS on STN
 AN 2000:270322 DN 133:86360 ED Entered STN: 26 Apr 2000
 TI Carbon **nanotube** atomic force microscopy tips: direct growth by
 chemical vapor deposition and application to high-resolution imaging
 AU Cheung, Chin Li; Hafner, Jason H.; Lieber, Charles M.
 CS Department of Chemistry and Chemical Biology, Harvard University,
 Cambridge, MA, M02138, USA
 SO Proceedings of the National Academy of Sciences of the United States of
 America (2000), 97(8), 3809-3813
 CODEN: PNASA6; ISSN: 0027-8424
 PB National Academy of Sciences
 AB Carbon **nanotubes** are potentially ideal atomic force microscopy probes because they can have
 diams. as small as one nanometer, have robust mech. properties, and can be specifically
 functionalized with **chem.** and **biol. probes** at the tip ends. This communication describes
 methods for the direct growth of carbon **nanotube** tips by chemical vapor deposition (CVD) using
 ethylene and iron catalysts deposited on com. silicon-cantilever-tip assemblies. SEM and TEM
 measurements demonstrate that multiwalled **nanotube** and single-walled **nanotube** tips can be
 grown by predictable variations in the CVD growth conditions. Force-displacement measurements
 made on the tips show that they buckle elastically and have very small (≤ 100 pN) nonspecific
 adhesion on mica surfaces in air. Anal. of images recorded on gold nanoparticle stds. shows
 that these multi- and single-walled carbon **nanotube** tips have radii of curvature of 3-6 and 2-
 4 nm, resp. Moreover, the **nanotube** tip radii determined from the nanoparticle images are
 consistent with those determined directly by TEM imaging of the **nanotube** ends. These mol.-
 scale CVD **nanotube** probes have been used to image isolated IgG and GroES proteins at high-
 resolution
 IT Immunoglobulins
 (G; direct growth of carbon **nanotubes** by chemical vapor
 deposition and application as high-resolution atomic force microscopy tips)
 IT Chaperonins
 (GroES; direct growth of carbon **nanotubes** by chemical vapor
 deposition and application as high-resolution atomic force microscopy tips)
 IT **Nanotubes**
 (carbon; direct growth of carbon **nanotubes** by chemical vapor
 deposition and application as high-resolution atomic force microscopy tips)
 IT 7440-21-3, Silicon, uses
 (direct growth of carbon **nanotubes** by chemical vapor deposition
 and application as high-resolution atomic force microscopy tips)
 RE.CNT 38 THERE ARE 38 CITED REFERENCES AVAILABLE FOR THIS RECORD
 (1) Akama, Y; J Vac Sci Technol A 1990, V8, P429 HCAPLUS
 (2) Bustamante, C; Biochemistry 1992, V31, P22 HCAPLUS
 (3) Bustamante, C; Curr Opin Struct Biol 1993, V3, P363 HCAPLUS
 (4) Bustamante, C; Curr Opin Struct Biol 1997, V7, P709 HCAPLUS
 (5) Campbell, J; J Am Chem Soc 1999, V121, P3779 HCAPLUS
 (6) Dai, H; Appl Phys Lett 1998, V73, P1508 HCAPLUS
 (7) Dai, H; Nature (London) 1996, V384, P147 HCAPLUS
 (8) Davos, A; Eur J Immunol 1988, V18, P1001
 (9) Engel, A; Curr Opin Struct Biol 1997, V7, P279 HCAPLUS
 (10) Frisbie, C; Science 1994, V265, P2071 HCAPLUS
 (11) Fritz, J; J Struct Biol 1997, V119, P165 HCAPLUS
 (12) Furuno, T; Ultramicroscopy 1998, V70, P125 HCAPLUS
 (13) Hafner, J; Chem Phys Lett 1998, V296, P195 HCAPLUS
 (14) Hafner, J; Nature (London) 1999, V398, P761 HCAPLUS
 (15) Hansma, H; J Struct Biol 1997, V119, P99 HCAPLUS
 (16) Harris, L; Biochemistry 1997, V36, P1581 HCAPLUS
 (17) Hunt, J; Nature (London) 1996, V379, P37 HCAPLUS
 (18) Ill, C; Biophys J 1993, V64, P919 HCAPLUS
 (19) Keller, D; Surf Sci 1992, V268, P333 HCAPLUS
 (20) Li, W; Science 1996, V274, P1701 HCAPLUS
 (21) Moller, C; Biophys J 1999, V77, P1150 HCAPLUS
 (22) Mou, J; FEBS Lett 1996, V381, P161 HCAPLUS
 (23) Muller, D; FEBS Lett 1998, V430, P105 HCAPLUS
 (24) Muller, D; J Struct Biol 1997, V119, P172 HCAPLUS
 (25) Murphy, P; Austr J Soil Res 1975, V13, P189 HCAPLUS
 (26) Nishijima, H; Appl Phys Lett 1999, V74, P4061 HCAPLUS
 (27) Noy, A; Annu Rev Mater Sci 1997, V27, P381 HCAPLUS
 (28) Noy, A; Langmuir 1998, V14, P1508 HCAPLUS
 (29) Perkins, S; J Mol Biol 1991, V221, P1345 HCAPLUS
 (30) Shao, Z; Adv Phys 1996, V45, P1 HCAPLUS
 (31) Sigler, P; Annu Rev Biochem 1998, V67, P581 HCAPLUS

L64 ANSWER 3 OF 5 HCAPLUS COPYRIGHT ACS on STN
AN 2000:212317 HCAPLUS
ED Entered STN: 03 Apr 2000
TI Analytical currents: nanotubes as chemical
sensors
AU Anon.
SO Analytical Chemistry (2000), 72(7), 256A
CODEN: ANCHAM; ISSN: 0003-2700
PB American Chemical Society
DT Journal; News Announcement
LA English
AB Unavailable

L58 ANSWER 7 OF 10 HCAPLUS COPYRIGHT ACS on STN

AN 2000:181722 HCAPLUS

DN 132:272099

ED Entered STN: 22 Mar 2000

TI Extreme oxygen sensitivity of electronic properties of carbon
nanotubes

AU Collins, Philip G.; Bradley, Ketih; Ishigami, Masa; Zettl, A.

CS Dep. Physics, Univ. California Berkeley, Berkeley, CA, 94720, USA

SO Science (Washington, D. C.) (2000), 287(5459), 1801-1804

CODEN: SCIEAS; ISSN: 0036-8075

PB American Association for the Advancement of Science

DT Journal

LA English

CC 76-1 (Electric Phenomena)

Section cross-reference(s): 65, 66

AB The electronic properties of **single-walled carbon nanotubes** are shown here to be extremely sensitive to the chemical environment. Exposure to air or oxygen dramatically influences the nanotubes' elec. resistance, thermoelec. power, and local d. of states, as determined by transport measurements and scanning tunneling spectroscopy. These electronic parameters can be reversibly "tuned" by surprisingly small concns. of adsorbed gases, and an apparently **semiconducting nanotube** can be converted into an apparent metal through such exposure. These results, although demonstrating that **nanotubes could find use as sensitive chemical gas sensors**, likewise indicate that many supposedly intrinsic properties measured on as-prepared nanotubes may be severely compromised by extrinsic air exposure effects.

ST air oxygen sensitivity electronic property carbon **nanotube**;
resistivity thermoelec power carbon **nanotube** sensitivity oxygen
air; transport electronic property carbon **nanotube** sensitivity
oxygen air; density state carbon **nanotube** sensitivity oxygen air

IT **Nanotubes**

RL: PEP (Physical, engineering or chemical process); PRP (Properties);

PROC (Process)

(carbon; extreme air and oxygen sensitivity of electronic properties of
carbon **nanotubes**)

IT Adsorbed substances

Air

Band gap

Density of states

Electric resistance

(extreme air and oxygen sensitivity of electronic properties of carbon
nanotubes)

IT Electron tunneling spectroscopy

(scanning; extreme air and oxygen sensitivity of electronic properties
of carbon **nanotubes**)

IT Power

(thermoelec.; extreme air and oxygen sensitivity of electronic
properties of carbon **nanotubes**)

IT 7440-37-1, Argon, properties 7782-44-7, Oxygen, properties

RL: PEP (Physical, engineering or chemical process); PRP (Properties);

PROC (Process)

(extreme air and oxygen sensitivity of electronic properties of carbon
nanotubes)

RE.CNT 27 THERE ARE 27 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Ahn, C; Appl Phys Lett 1998, V73, P3378 HCAPLUS

(2) Anon; Graphite Intercalation Compounds 2 1992, V18

(3) Ayappa, K; Langmuir 1998, V14, P880 HCAPLUS

(4) Bockrath, M; Science 1997, V275, P1922 HCAPLUS

(5) Britto, P; Adv Mater 1999, V11, P154 HCAPLUS

(6) Chambers, A; J Phys Chem B 1998, V102, P4253 HCAPLUS

(7) Collins, P; Bull Am Phys Soc 1999, V44, P1889

(8) Collins, P; in preparation

(9) Dillon, A; Nature 1997, V386, P377 HCAPLUS

(10) Dresselhaus, M; Science of Fullerenes and Carbon Nanotubes 1996

(11) Grigorian, L; Phys Rev B 1999, V60, PR11309 HCAPLUS

(12) Hamada, N; Phys Rev Lett 1992, V68, P1579 HCAPLUS

(13) Hone, J; Phys Rev Lett 1998, V80, P1042 HCAPLUS

(14) Kobayashi, N; J Chem Phys 1998, V109, P1983 HCAPLUS

L62 ANSWER 7 OF 14 HCAPLUS COPYRIGHT ACS on STN

AN 1999:723270 HCAPLUS

DN 131:334353

ED Entered STN: 12 Nov 1999

TI Method for immobilizing and/or crystallizing biological macromolecules on **carbon nanotubes**, and applications

IN Balavoine, Fabrice; Mioskowski, Charles; Schultz, Patrick; Richard, Cyrille

PA Commissariat a l'Energie Atomique, Fr.; Centre National de la Recherche Scientifique-CNRS

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 9957564	A1	19991111	WO 1999-FR1086	19990507 <--
FR 2778846	A1	19991126	FR 1998-6539	19980525
FR 2778846	B1	20010511		
AU 9935292	A1	19991123	AU 1999-35292	19990507 <--
EP 1078261	A1	20010228	EP 1999-917007	19990507 <--
EP 1078261	B1	20041027		
R: DE, FR, GB, NL				
JP 2002513815	T2	20020514	JP 2000-547479	19990507 <--
US 6656712	B1	20031202	US 2000-673668	20001201 <--
US 2004018543	A1	20040129	US 2003-618586	20030715 <--
PRAI EP 1998-401114	A	19980507	<--	
FR 1998-6539	A	19980525	<--	
WO 1999-FR1086	W	19990507	<--	
US 2000-673668	A3	20001201	<--	

AB The invention concerns the immobilization, and crystallization of biol. macromols. via self assembly on carbon multiwall **nanotubes** (MWNT) by adding the macromols. to the solution that contains the closed end MWNT and incubating for 15 min without stirring or agitation at optimal conditions. Macromols. are soluble proteins, membrane and transmembrane proteins, enzymes, antibodies, antibody fragments, or nucleic acids. The carbon **nanotubes** are functionalized by the phys. adsorption of linkers that are of the general formula H-E-L. H represents a hydrophile group; with pos. or neg. charge; an analog of the biomol., a metal complex, e.g. Ni-NTA, Cu-IDA; the group contains a binding site to the spacer arm E. E spacer arm is a C1-C10 mol.; the chain can contain a phosphate group; the end group can be N, O, S containing L is a lipid with multiple chains, C12-C20 saturated or non-saturated; five or six member aromatic ring with substituents. The synthesis of a biotinylated ethoxy-anthracene-acetamide linker is described. The immobilized biomols. are used for structure studies, as receptors and bioconductors for **biosensors**.

IT **Nanotubes**

RL: PEP (Physical, engineering or chemical process); PRP (Properties);

PROC (Process)

(carbon; method for immobilizing and/or crystallizing biol. macromols. on **carbon nanotubes**, and applications)

IT Immunoglobulins

RL: PEP (Physical, engineering or chemical process); PRP (Properties);

PROC (Process)

(fragments; method for immobilizing and/or crystallizing biol. macromols. on **carbon nanotubes**, and applications)

IT Proteins, specific or class

RL: PEP (Physical, engineering or chemical process); PRP (Properties);

PROC (Process)

(membrane; method for immobilizing and/or crystallizing biol. macromols. on **carbon nanotubes**, and applications)IT **Biosensors**

Self-assembly

(method for immobilizing and/or crystallizing biol. macromols. on **carbon nanotubes**, and applications)

IT Antibodies

Enzymes, properties

Nucleic acids

(method for immobilizing and/or crystallizing biol. macromols. on **carbon nanotubes**, and applications)

IT Adsorption

(protein; method for immobilizing and/or crystallizing biol. macromols. on **carbon nanotubes**, and applications)

IT Proteins, specific or class

L32 ANSWER 43 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 1999:690005 HCAPLUS
DN 132:29170
ED Entered STN: 29 Oct 1999
TI Electronic properties and adsorption **sensitivity** of thin CdSe
films with modified surface
AU Vashpanov, Yu. A.
CS Mechnikov Odesa State University, Odesa, 270026, Ukraine
SO Ukrains'kii Fizichnii Zhurnal (1999), 44(8), 1017-1021
CODEN: UFZHFY; ISSN: 0372-400X
PB Natsional'na Akademiya Nauk Ukraini, Viddilennya Fiziki i Astronomii
DT Journal
LA Ukrainian
CC 76-2 (Electric Phenomena)
Section cross-reference(s): 66
AB The electronic properties and **adsorption sensitivity to oxygen** of thin semiconductor films of cadmium selenide whose surface is doped by atoms of indium and selenium are investigated. Reduction of the bond energy of oxygen with the surface of material Eta and occurrence of adsorption **sensitivity** at room temperature are found. The samples contain characteristic **nanowires of In and Se atoms on their surface**. The phys. mechanism of reduction of the parameter Eta is connected with the electrostatic interaction of charges on the surface of **nanowires** .

2/9/10

DIALOG(R)File 5:Biosis Previews(R)

(c) BIOSIS. All rts. reserv.

0012084889 BIOSIS NO.: 199900344549

Fullerene nanotubes for molecular electronics

AUTHOR: Colbert Daniel T (Reprint); Smalley Richard E (Reprint)

AUTHOR ADDRESS: Center for Nanoscale Science and Technology, Rice

University, Houston, TX, 77251, USA**USA

JOURNAL: Trends in Biotechnology 17 (2): p46-50 Feb., 1999 1999

MEDIUM: print

ISSN: 0167-7799

DOCUMENT TYPE: Article

RECORD TYPE: Abstract

LANGUAGE: English

ABSTRACT: Fullerene nanotubes hold tremendous promise for numerous applications, owing to their remarkable properties, including strength, toughness, chemical robustness, thermal conductivity and, perhaps most interestingly, electrical conductivity. Depending on their precise molecular symmetry, some nanotubes are semiconducting, while others exhibit truly metallic conductivity. This behaviour, coupled with their nanoscale geometry, makes them ideal, perhaps unique, candidates for wires, interconnects and even devices for true molecular electronics. DESCRIPTORS:

MAJOR CONCEPTS: Equipment, Apparatus, Devices and Instrumentation

METHODS & EQUIPMENT: fullerene nanotubes--chemical robustness, electrical conductivity, strength, thermal conductivity, equipment, toughness; interconnects--equipment; molecular electronic devices--equipment; wires--equipment

MISCELLANEOUS TERMS: metallic conductivity; semiconducting

CONCEPT CODES:

10502 Biophysics - General

10060 Biochemistry studies - General

00532 General biology - Miscellaneous

L32 ANSWER 45 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 1999:601797 HCAPLUS
 DN 131:315997
 ED Entered STN: 23 Sep 1999
 TI In-situ studies of the formation of Ga and Al wires on Si(112) facet surfaces
 AU Prokes, S. M.; Glembocki, O. J.
 CS Naval Research Laboratory, Washington, DC, 20375-5347, USA
 SO Materials Research Society Symposium Proceedings (1999), 570(Epitaxial Growth--Principles and Applications), 117-127
 CODEN: MRSPDH; ISSN: 0272-9172
 PB Materials Research Society
 DT Journal
 LA English
 CC 75-1 (Crystallography and Liquid Crystals)
 Section cross-reference(s): 76
 AB Reflectance difference anisotropy (RDA) and LEED were used to study the formation of Ga or Al chains and **nanowires** on the Si(112) surface. At $T > 350^\circ$, the Ga or Al chains form at the step edges by a self-limiting process, while at lower temps., Ga or Al **nanowires** form on the terraces in addition to the chains on the ledges. The process was tracked in real time from the rapid change of the (2+1) Si(112) reconstruction under sub-critical coverage to chain formation leading to a 5+1 reconstruction followed by a 6+1 reconstruction. During sequential deposition of Ga and Al, the authors observe (in RDA and AES) that Ga atoms forming the chains can be replaced by Al, indicating a stronger Al-Si bond strength and confirming the **chemical sensitivity** of the light scattering in RDA. Low temperature depositions (in the 300° range) give Al (or Ga) metallic wires on the Si(111) terraces. Continued deposition of <10 monolayers at $T < 250^\circ$ leads to a very anisotropic but patterned Al or Ga structure in registry with the substrate which retains an unexpectedly large polarizability for coverages as thick as 40 mL.
 ST formation gallium aluminum wire silicon facet surface
 IT Bond energy
 (Al-Si and Ga-Si bond strength in formation of gallium and aluminum wires on Si(112) facet surfaces)
 IT 7429-90-5, Aluminum, properties 7440-21-3, Silicon, properties
 7440-55-3, Gallium, properties
 RL: PEP (Physical, engineering or chemical process); PRP (Properties);
 PROC (Process)
 (In-situ studies of formation of Ga and Al wires on Si(112) facet surfaces)
 RE.CNT 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD
 RE
 (1) Aspnes, D; J Vac Sci Technol 1988, VA6, P1327
 (2) Baski, A; Surface Science submitted
 (3) Glembocki, O; Appl Phys Lett 1997, V71, P2355 HCAPLUS
 (4) Good, R; Classical Theory of Electric and Magnetic Fields 1971, P512
 (5) Hill, I; Phys Rev B 1997, V56, P15725 HCAPLUS
 (6) Jung, T; J Vac Sci Technol 1994, VA12, P1838
 (7) Jung, T; Surf Sci Lett 1993, V289, PL577 HCAPLUS
 (8) Petroff, P; Ultramicroscopy 1989, V31, P67 HCAPLUS
 (9) Prokes, S; J Vacuum Sci and Technol B submitted
 (10) Prokes, S; Materials Research Society Symposium Proceedings 1997, V448, P217 HCAPLUS
 (11) Sanderson, R; Polar Covalence 1983, P40
 (12) Sung, K; J Electrochem Soc 1995, V142, P206 HCAPLUS
 (13) Yater, J; Phys Rev 1995, VB51, P7365

L65 ANSWER 13 OF 35 HCAPLUS COPYRIGHT ACS on STN

AN 1999:567603 HCAPLUS
DN 131:239884
ED Entered STN: 09 Sep 1999
TI Carbon nanotube tips as nanometer scale probes for
chemistry and biology
AU Wong, Stanislaus Sherwood
CS Harvard Univ., Cambridge, MA, USA
SO (1999) 200 pp. Avail.: UMI, Order No. DA9921544
From: Diss. Abstr. Int., B 1999, 60(3), 1107
DT Dissertation
LA English
CC 9-1 (Biochemical Methods)
Section cross-reference(s): 6, 66
AB Unavailable
ST carbon nanotube tip nanometer scale probe chem
biol
IT Atomic force microscopy
Imaging
(carbon nanotube tips as nanometer scale probes for
chemical and biol.)
IT Nanotubes
RL: ARU (Analytical role, unclassified); DEV (Device component use); ANST
(Analytical study); USES (Uses)
(carbon; carbon nanotube tips as nanometer scale
probes for chemical and biol.)

Carbon nanotube tips as nanometer-scale probes for chemistry and biology.

by Wong, Stanislaus Sherwood, Ph.D., Harvard University, 1999, 200 pages; AAT 9921544

Advisor: Lieber, Charles M.

School: Harvard University

School Location: United States -- Massachusetts

Index terms(keywords): Carbon, Probes, Amyloid fibrils, pH, Atomic force microscopy, Nanotube tips, Nanometer-scale

Source: DAI-B 60/03, p. 1107, Sep 1999

Source type: DISSERTATION

Subjects: Chemistry, Analytical chemistry, Cellular biology

Publication Number: AAT 9921544

ISBN: 0599207647

Document URL: <http://proquest.umi.com/pqdweb?did=733939331&sid=6&Fmt=2&clientid=19649&RQT=309&VName=PQD>

ProQuest document ID: 733939331

Abstract (Document Summary)

Of an intrinsic structural beauty, carbon nanotubes (NTs) consist of concentrically nested shells of sp^2 -hybridized (trivalent) carbon atoms forming a hexagonal network that is itself arranged helically within the tubular motif. Synthesized and purified NTs represent an ideal structure for the probe tips used in many scanning probe microscopies, such as atomic force microscopy (AFM). In addition to the high aspect ratio of NTs, which allows for probing deep crevices, their unique ability to buckle elastically makes these tips very robust while limiting the maximum force applied to delicate organic and biological samples. Both multi wall (MWNT) and single-wall (SWNT) carbon nanotubes have been attached to the ends of single crystal silicon cantilever-tip assemblies.

Initial imaging studies have addressed their potential to improve lateral resolution as well as to probe biological systems. Amyloid [Special characters omitted.] (1-40) derived protofibrils and fibrils, implicated in Alzheimer's disease, have been imaged with MWNT tips, yielding a 12-30% improvement in lateral resolution, compared with conventional Si tips. With SWNT tips, the improvement in resolution is 70% for imaging amyloid and double-stranded DNA. Moreover, SWNT tips have been used to resolve substructure within dispersed SWNTs on surfaces. Because individual SWNTs have radii of 0.5-0.7 nm, strategies for achieving molecular-resolution imaging are discussed.

Both MWNT and SWNT tips have been chemically modified to present acidic, basic, and hydrophobic functionality. Force titrations recorded between these NT tips and hydroxy-terminated self-assembled monolayers (SAMs) show (i) finite adhesion at low pH and no measurable adhesion at high pH for unmodified, carboxyl-terminated NT tips, (ii) no measurable adhesion at low pH and finite adhesion at high pH for amine-terminated NT tips, and (iii) pH independent adhesion for phenyl-terminated NT tips. This adhesion vs. pH behavior is consistent with the tip functionalities. Furthermore, MWNT tips modified with biotin have been used to measure the binding force between single streptavidin-biotin pairs.

In addition, functionalized nanotube tips have been used to map chemical domains on surfaces with nanometer resolution. Intermittent contact phase images obtained in ethanol on methyl/carboxyl patterned SAMs show greater phase lag between the carboxyl regions and COOH terminated NT tips, whereas phase images taken with phenyl terminated tips exhibit greater phase lag in the methyl terminated areas in agreement with the expected adhesion trends. Furthermore, images of partial bilayer structures that present carboxyl and methyl functionalities show that SWNT tips yield chemically-sensitive lateral resolution of ~ 3 nm. These new AFM probes provide a clear pathway for achieving molecular resolution, chemically sensitive imaging of chemical and biological systems.

Copyright © 2005 ProQuest Information and Learning Company. All rights reserved. [Terms and Conditions](#)

[Text-only interface](#)

From: ProQuest
COMPANY

L62 ANSWER 8 OF 14 HCAPLUS COPYRIGHT ACS on STN

AN 1999:470213 HCAPLUS
 DN 131:254597
 ED Entered STN: 02 Aug 1999
 TI Helical crystallization of proteins on carbon nanotubes: a first step towards the development of new biosensors
 AU Balavoine, Fabrice; Schultz, Patrick; Richard, Cyrille; Mallouh, Veronique; Ebbesen, Thomas W.; Mioskowski, Charles
 CS CEA Saclay-DSV/DBCM/SMM, Gif sur Yvette, 91191, Fr.
 SO Angewandte Chemie, International Edition (1999), 38(13/14), 1912-1915
 CODEN: ACIEF5; ISSN: 1433-7851
 PB Wiley-VCH Verlag GmbH
 DT Journal
 LA English
 CC 9-16 (Biochemical Methods)
 Section cross-reference(s): 6
 AB To demonstrate the potential of carbon nanotubes in structural biol. and biotechnol., streptavidin and HupR, both are water soluble proteins, were chosen to study the crystallization and interaction of proteins with carbon nanotubes.
 ST protein crystn carbon nanotube biosensor
 IT Biosensors
 Microscopy
 (helical crystallization of proteins on carbon nanotubes and a first step towards the development of new biosensors)
 IT Proteins, general, biological studies
 RL: BSU (Biological study, unclassified); PEP (Physical, engineering or chemical process); BIOL (Biological study); PROC (Process)
 (helical crystallization of proteins on carbon nanotubes and a first step towards the development of new biosensors)
 IT 7440-44-0, Carbon, uses
 RL: TEM (Technical or engineered material use); USES (Uses)
 (helical crystallization of proteins on carbon nanotubes and a first step towards the development of new biosensors)
 RE.CNT 26 THERE ARE 26 CITED REFERENCES AVAILABLE FOR THIS RECORD
 RE
 (1) Amos, L; Prog Biophys Mol Biol 1982, V39, P183 HCAPLUS
 (2) Bayer, E; Methods Enzymol 1990, V184, P80 HCAPLUS
 (3) Chaiet, L; Arch Biochem Biophys 1964, V106, P1 MEDLINE
 (4) Dai, H; Nature 1996, V384, P147 HCAPLUS
 (5) Darst, S; Biophys J 1991, V59, P387 HCAPLUS
 (6) Davis, J; Inorg Chim 1998, V272, P261 HCAPLUS
 (7) DeRosier, D; J Mol Biol 1970, V52, P355 HCAPLUS
 (8) Ebbesen, T; Carbon Nanotubes-Preparation and Properties 1997
 (9) Furuno, T; Biophys J 1993, V65, P1714 HCAPLUS
 (10) Guo, Z; Adv Mater 1998, V10, P701 HCAPLUS
 (11) Hendrickson, W; Proc Natl Acad Sci 1989, V86, P2190 HCAPLUS
 (12) Hoenger, A; Nature 1995, V376, P271 HCAPLUS
 (13) Iijima, S; Nature 1991, V354, P56 HCAPLUS
 (14) Jeng, T; J Mol Biol 1989, V205, P251 HCAPLUS
 (15) Lebeau, L; Handbook of nonmedical applications of liposomes 1996, V2, P155
 (16) Richaud, P; J Bacteriol 1991, V173, P5928 HCAPLUS
 (17) Ringler, P; Chem Eur J 1997, V3, P620 HCAPLUS
 (18) Schwidop, W; J Chromatogr 1990, V520, P325 HCAPLUS
 (19) Treacy, M; Nature 1996, V381, P678 HCAPLUS
 (20) Tsang, S; Angew Chem 1997, V109, P2291
 (21) Tsang, S; Angew Chem Int Ed 1997, V36, P2198 HCAPLUS
 (22) Unwin, N; J Mol Biol 1993, V229, P1101 HCAPLUS
 (23) Van Heel, M; Ultramicroscopy 1981, V7, P113
 (24) Venien-Bryan, C; J Mol Biol 1997, V274, P687 HCAPLUS
 (25) Wilson-Kubalek, E; Proc Natl Acad Sci 1998, V95, P8040 HCAPLUS
 (26) Wong, S; Nature 1998, V394, P52 HCAPLUS

L32 ANSWER 53 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 1999:418238 HCAPLUS

DN 131:190015

ED Entered STN: 07 Jul 1999

TI Formation and characterization of metal atom nanostructures on Si(112) facet surfaces

AU Prokes, S. M.; Glembocki, O. J.

CS Naval Research Laboratory, Washington, DC, 20375-5347, USA

SO Journal of Vacuum Science & Technology, A: Vacuum, Surfaces, and Films (1999), 17(4, Pt. 1), 1410-1414
CODEN: JVTAD6; ISSN: 0734-2101

PB American Institute of Physics

DT Journal

LA English

CC 66-3 (Surface Chemistry and Colloids)

Section cross-reference(s): 56, 73

AB Auger electron spectroscopy (AES) and reflectance anisotropy (RA) have been used to study the formation of Ga or Al chains and nanowires on the Si(112) surface. The Ga or Al chains form on the step ledges by a self-limiting process at higher temps. (>350 °C), while at lower temps., Ga or Al nanowires form on the terraces in addition to the chains on the ledges. The process has been tracked in real time from the rapid change of the (2+1) Si(112) reconstruction under subcrit. coverage to chain formation leading to a 5+1 reconstruction followed by a 6+1 reconstruction. During sequential deposition of Ga and Al, it was observed (in RA and AES) that Ga atoms forming the chains can be replaced by Al. This indicates that the Al-Si bond is stronger than the Ga-Si bond and confirms the chemical sensitivity of the light scattering in RA. Low temperature depositions (in the 300 °C range) are shown to lead to the formation of Ga or Al metallic wires on the Si(111) terraces. Continued deposition of less than 10 monolayers at T below 250 °C leads to a very anisotropic but patterned Al or Ga structure in registry with the substrate which retains an unexpectedly large polarizability for coverages as thick as 40 monolayers.

IT Nanostructures

Nanowires (metallic)

(formation and characterization of Ga and Al chains and nanowires on Si(112) surface)

IT 7429-90-5, Aluminum, properties 7440-21-3, Silicon, properties

7440-55-3, Gallium, properties

RL: PEP (Physical, engineering or chemical process); PRP (Properties);

PROC (Process)

(formation and characterization of Ga and Al chains and nanowires on Si(112) surface)

RE.CNT 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Aspnes, D; J Vac Sci Technol A 1988, V6, P1327 HCAPLUS

(2) Baski, A; Surf Sci 1999, V423, PL265 HCAPLUS

(3) Glembocki, O; Appl Phys Lett 1997, V71, P2355 HCAPLUS

(4) Good, R; Classical Theory of Electric and Magnetic Fields 1971, P512

(5) Hill, I; Phys Rev B 1997, V56, P15725 HCAPLUS

(6) Jung, T; J Vac Sci Technol A 1994, V12, P1838 HCAPLUS

(7) Jung, T; Surf Sci Lett 1993, V289, PL577 HCAPLUS

(8) Petroff, P; Ultramicroscopy 1989, V31, P67 HCAPLUS

(9) Prokes, S; Mater Res Soc Symp Proc 1997, V448, P217 HCAPLUS

(10) Sanderson, R; Polar Covalence 1983, P40

(11) Sung, K; J Electrochem Soc 1995, V142, P206 HCAPLUS

(12) Yater, J; Phys Rev B 1995, V51, P7365 HCAPLUS

L56 ANSWER 2 OF 4 HCAPLUS COPYRIGHT ACS on STN
 AN 1999:391295 HCAPLUS
 DN 131:137757
 ED Entered STN: 25 Jun 1999
 TI Functionalization of carbon nanotube AFM probes using
 tip-activated gases
 AU Wong, Stanislaus S.; Woolley, Adam T.; Joselevich, Ernesto; Lieber,
 Charles M.
 CS Department of Chemistry and Chemical Biology, Harvard University,
 Cambridge, MA, 02138, USA
 SO Chemical Physics Letters (1999), 306(5,6), 219-225
 CODEN: CHPLBC; ISSN: 0009-2614
 PB Elsevier Science B.V.
 DT Journal
 LA English
 CC 76-12 (Electric Phenomena)
 Section cross-reference(s): 66
 AB Multiwalled C nanotube (MWNT) probe microscopy tips were functionalized with gases, activated
 in a transient arc produced at the tip ends. Adhesion measurements between these tips and
 hydroxyl-terminated monolayers vs. pH reveal that MWNT tips reacted in O₂, H₂ and N₂ display
 acidic, pH-independent and basic properties, resp. MWNT tips derivatized in O₂/N₂ and H₂/N₂
 mixts. demonstrate the greater reactivity of C nanotubes towards O₂ and H₂, resp. Also, the
 chemical reactivity of tips functionalized in N₂ suggests termination in aromatic N
 heterocycles. Tip-activated gas functionalization of MWNTs provides facile generation of
 chemical sensitive nanoprobe.
 ST functional group carbon nanotube AFM gas reaction; oxygen
 reaction carbon nanotube tip AFM; hydrogen reaction carbon
 nanotube tip AFM; nitrogen reaction carbon nanotube tip
 AFM
 IT 532-32-1, Sodium benzoate 1333-74-0, Hydrogen, reactions 4432-31-9,
 2-[N-Morpholino]ethanesulfonic acid 7727-37-9, Nitrogen, reactions
 7782-44-7, Oxygen, reactions 25952-53-8, 1-Ethyl-3-(3-
 dimethylaminopropyl) carbodiimide hydrochloride
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (functionalization of carbon nanotube AFM probes using
 tip-activated gases in arc)
 RE.CNT 19 THERE ARE 19 CITED REFERENCES AVAILABLE FOR THIS RECORD
 RE
 (1) Binnig, G; Phys Rev Lett 1986, V56, P930
 (2) Bodanszky, M; The Practice of Peptide Synthesis 2nd edn 1994
 (3) Bustamante, C; Curr Opin Struct Biol 1997, V7, P709 HCAPLUS
 (4) Colbert, D; Science 1994, V266, P1218 HCAPLUS
 (5) Dai, H; Nature 1996, V384, P147 HCAPLUS
 (6) Evans, J; J Electroanal Chem 1977, V80, P409 HCAPLUS
 (7) Gomer, R; Field Emission and Field Ionization 1961
 (8) Hansma, P; Appl Phys Lett 1994, V64, P1738 HCAPLUS
 (9) Hiura, H; Adv Mater 1995, V7, P275 HCAPLUS
 (10) Noy, A; Annu Rev Mater Sci 1997, V27, P381 HCAPLUS
 (11) Rinzler, A; Science 1995, V269, P1550 HCAPLUS
 (12) Thoma, A; J Phys Chem 1992, V96, P7231 HCAPLUS
 (13) Vezenov, D; J Am Chem Soc 1997, V119, P2006
 (14) Wandass, J; J Electrochem Soc 1987, V134, P2734 HCAPLUS
 (15) Wong, E; Science 1997, V277, P1971 HCAPLUS
 (16) Wong, S; Appl Phys Lett 1998, V73, P3465 HCAPLUS
 (17) Wong, S; J Am Chem Soc 1998, V120, P603 HCAPLUS
 (18) Wong, S; J Am Chem Soc 1998, V120, P8557 HCAPLUS
 (19) Wong, S; Nature 1998, V394, P52 HCAPLUS

L62 ANSWER 9 OF 14 HCAPLUS COPYRIGHT ACS on STN

AN 1999:328172 HCAPLUS
 DN 131:124709
 ED Entered STN: 28 May 1999
 TI Construction of a glucose biosensor immobilized with glucose
 oxidase in the film of polypyrrole nanotubules
 AU Miao, Yuqing; Qi, Ming; Zhan, Shuzhong; He, Nongyue; Wang, Jian; Yuan,
 Chunwei
 CS National Laboratory of Molecular and Biomolecular Electronics, Southeast
 University, Nanjing, 210096, Peop. Rep. China
 SO Analytical Letters (1999), 32(7), 1287-1299
 CODEN: ANALBP; ISSN: 0003-2719
 PB Marcel Dekker, Inc.
 DT Journal
 LA English
 CC 80-2 (Organic Analytical Chemistry)
 Section cross-reference(s): 9
 AB By electrochem. adsorption of glucose oxidase (GO) on a polypyrrole (PPy) nanotubular layer, a
 glucose biosensor was fabricated. PPy microtubules can be synthesized by oxidative
 polymerization of the pyrrole monomer within the pores of a polycarbonate template. The
 activities of immobilized GO were studied and the electrochem. properties were characterized
 by comparison of the GO electrode constructed by electropolymn. and doping.
 ST glucose biosensor immobilized oxidase film; polypyrrole
 nanotubule oxidase immobilized glucose biosensor
 IT Biosensors
 Enzyme electrodes
 Microtubule
 (construction of a glucose biosensor immobilized with glucose
 oxidase in the film of polypyrrole nanotubules)
 IT 50-99-7, D-Glucose, analysis
 RL: ANT (Analyte); ANST (Analytical study)
 (construction of a glucose biosensor immobilized with glucose
 oxidase in the film of polypyrrole nanotubules)
 IT 9001-37-0, Glucose oxidase 30604-81-0, Polypyrrole
 RL: ARU (Analytical role, unclassified); DEV (Device component use); ANST
 (Analytical study); USES (Uses)
 (construction of a glucose biosensor immobilized with glucose
 oxidase in the film of polypyrrole nanotubules)
 RE.CNT 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD
 RE
 (1) Cooper, J; Biosensors Bioelectron 1992, V5, P473
 (2) Cornelis, G; J ChemSoc Chem Commun 1991, P1691
 (3) Foulds, N; J Chem Soc Faraday Trans 1986, V1(82), P1259
 (4) Lee, J; Sensors and Actuators B 1991, V3, P215
 (5) Malitesta, C; Anal Chem 1990, V62, P2735 HCAPLUS
 (6) Martin, C; Science 1994, V266, P1961 HCAPLUS
 (7) Parthasarathy, R; Nature 1994, V369, P298 HCAPLUS
 (8) Tatsuma, T; Anal Chem 1992, V64, P1183 HCAPLUS
 (9) Turner, A; Biosensors Fundamentals and Applications 1987
 (10) Worthington Biochemical Corporation; Worthington Enzyme Manual 1977
 (11) Xue, H; J Electroanal Chem 1995, V397, P241 HCAPLUS
 (12) Yon Hin, B; Sensors and Actuaors B 1992, V7, P339

L62 ANSWER 10 OF 14 HCAPLUS COPYRIGHT ACS on STN

AN 1999:100743 HCAPLUS

DN 130:121849

ED Entered STN: 16 Feb 1999

TI Graphitic nanotubes in luminescence assays

IN Massey, Richard J.; Martin, Mark T.; Dong, Liwen; Lu, Ming; Fischer, Alan; Jameison, Fabian; Liang, Pam; Hoch, Robert; Leland, Jonathan K.

PA Meso Scale Technology, USA

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 5866434	A	19990202	US 1996-611347	19960306 <--
	US 6203814	B1	20010320	US 1994-352400	19941208
	CA 2207282	AA	19960613	CA 1995-2207282	19951208 <--
	ES 2210324	T3	20040701	ES 1995-944093	19951208 <--
	ZA 9701915	A	19970909	ZA 1997-1915	19970305 <--
	CA 2248893	AA	19970912	CA 1997-2248893	19970305 <--
	WO 9733176	A1	19970912	WO 1997-US3653	19970305 <--
	AU 9720737	A1	19970922	AU 1997-20737	19970305 <--
	AU 724509	B2	20000921		
	EP 885393	A1	19981223	EP 1997-908967	19970305 <--
	CN 1217791	A	19990526	CN 1997-194334	19970305 <--
	JP 2001507787	T2	20010612	JP 1997-531989	19970305 <--
	IL 125985	A1	20020725	IL 1997-125985	19970305 <--
	RU 2189043	C2	20020910	RU 1998-116668	19970305 <--
	US 6362011	B1	20020326	US 1999-243215	19990202 <--
	US 2002086335	A1	20020704	US 2001-7526	20011205 <--
PRAI	US 1994-352400	A2	19941208	<--	
	US 1996-611347	A	19960306	<--	
	WO 1997-US3653	W	19970305	<--	
	US 1999-243215	A1	19990202	<--	

AB Graphitic nanotubes, which include tubular fullerenes (commonly called "buckytubes") and fibrils, which are functionalized by chemical substitution, are used as solid supports in electrogenerated chemiluminescence assays. The graphitic nanotubes are chemical modified with functional group biomols. prior to use in an assay. Association of electrochemiluminescent ruthenium complexes with the functional group biomol.-modified nanotubes permits detection of mols. including nucleic acids, antigens, enzymes, and enzyme substrates by multiple formats.

ST graphitic nanotube electrochemiluminescence binding assay;
tubular fullerene nanotube support electrochemiluminescence
assay; biosensor electrochemiluminescence carbon
nanotube; immunoassay electrochemiluminescence graphitic
nanotube; ruthenium complex electrochemiluminescence graphitic
nanotube

IT Separation
(affinity; graphitic nanotubes in luminescence assays of
biomols. and biopolymers)

IT Nanotubes
Nanotubes
RL: ARG (Analytical reagent use); RCT (Reactant); ANST (Analytical study);
RACT (Reactant or reagent); USES (Uses)
(carbon fibers; graphitic nanotubes in luminescence assays of
biomols. and biopolymers)

IT Nanotubes
RL: ARG (Analytical reagent use); RCT (Reactant); ANST (Analytical study);
RACT (Reactant or reagent); USES (Uses)
(carbon; graphitic nanotubes in luminescence assays of
biomols. and biopolymers)

IT Chemiluminescence spectroscopy
(electro-; graphitic nanotubes in luminescence assays of
biomols. and biopolymers)

IT Immunoassay
Luminescence, chemiluminescence
(electrochemiluminescence; graphitic nanotubes in
luminescence assays of biomols. and biopolymers)

IT Biosensors
(enzymic; graphitic nanotubes in luminescence assays of
biomols. and biopolymers)

IT Avidins

L19 ANSWER 4 OF 5 HCAPLUS COPYRIGHT ACS on STN

AN 1998:815674 HCAPLUS
 DN 130:249046
 ED Entered STN: 01 Jan 1999
 TI Subcellular optochemical **nanobiosensors**: probes encapsulated by biologically localized embedding (PEBBLEs)
 AU Clark, Heather A.; Barker, Susan L. R.; Brasuel, Murphy; Miller, Michael T.; Monson, Eric; Parus, Steve; Shi, Zhong-You; Song, Antonius; Thorsrud, Bjorn; Kopelman, Raoul; Ade, Alex; Meixner, Walter; Athey, Brian; Hoyer, Marion; Hill, Dwayne; Lightle, Rhonda; Philbert, Martin A.
 CS Department of Chemistry, University of Michigan, Ann Arbor, MI, 48109-1055, USA
 SO Sensors and Actuators, B: Chemical (1998), B51(1-3), 12-16
 CODEN: SABCEB; ISSN: 0925-4005
 PB Elsevier Science S.A.
 DT Journal
 LA English
 CC 9-16 (Biochemical Methods)
 AB Described here are arguably the world's smallest stand-alone devices/sensors, consisting of multicomponent nano-spheres with radii as small as 10 nm, occupying ≈ 1 ppb of a typical mammalian cell's volume. The probe is prepared from up to seven ingredients and is optimized for selective and reversible analyte detection, as well as sensor stability and reproducibility. Such a sensor probe encapsulated by biol. localized embedding (PEBBLE), is delivered into a cell by a variety of minimally-invasive techniques, including a pico-injector, a gene gun, liposomal incorporation and natural ingestion. These remote nano-optodes (PEBBLEs) have been prepared for pH, calcium, magnesium, potassium and oxygen. The sensor PEBBLEs can be inserted into a cell individually, in clusters (single analyte), in sets (multi-analyte) or in ensembles (single analyte, multiple locations).
 ST **nanobiosensor** PEBBLE optrode
 IT Animal cell line
 (SH-SY5Y; subcellular optochem. **nanobiosensors**, probes encapsulated by biol. localized embedding (PEBBLEs))
 IT Optrodes
 Optrodes
 (biosensors; subcellular optochem. **nanobiosensors**, probes encapsulated by biol. localized embedding (PEBBLEs))
 IT Biosensors
 Biosensors
 (optrodes; subcellular optochem. **nanobiosensors**, probes encapsulated by biol. localized embedding (PEBBLEs))
 IT Nanomachines
 (subcellular optochem. **nanobiosensors**, probes encapsulated by biol. localized embedding (PEBBLEs))
 IT 128724-35-6, Carboxynaphthofluorescein
 RL: ARG (Analytical reagent use); ANST (Analytical study); USES (Uses)
 (subcellular optochem. **nanobiosensors**, probes encapsulated by biol. localized embedding (PEBBLEs))
 IT 79-06-1, Acrylamide, reactions 94-36-0, Benzoyl peroxide, reactions 110-26-9 119-61-9, Benzophenone, reactions 3179-47-3, Decyl methacrylate 10041-19-7, Dioctyl sulfosuccinate 58264-26-9, Hexane dioldimethacrylate
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (subcellular optochem. **nanobiosensors**, probes encapsulated by biol. localized embedding (PEBBLEs))
 RE.CNT 11 THERE ARE 11 CITED REFERENCES AVAILABLE FOR THIS RECORD
 (1) Ambrose, T; Electroanalysis 1996, V8, P1095 HCAPLUS
 (2) Barker, S; Anal Chem 1998, V70, P100 HCAPLUS
 (3) Barker, S; Anal Chem 1998, V70, P971 HCAPLUS
 (4) Kopelman, R; SPIE 1996, V2836, P2 HCAPLUS
 (5) Peterson, J; Anal Chem 1980, V52, P864 HCAPLUS
 (6) Sasaki, K; Chem Lett 1996, P141 HCAPLUS
 (7) Shortreed, M; Anal Chem 1996, V68, P2656 HCAPLUS
 (8) Shortreed, M; Sensors and Actuators B 1997, V38-39, P8
 (9) Tan, W; Science 1992, V258, P778 HCAPLUS
 (10) Wightman, R; A J Bard 1989, V15
 (11) Wightman, R; Anal Chem 1988, V60, P769A HCAPLUS

L62 ANSWER 11 OF 14 HCAPLUS COPYRIGHT ACS on STN

AN 1998:801871 HCAPLUS
 DN 130:135446
 ED Entered STN: 23 Dec 1998
 TI Carriers and channels: current progress and future prospects
 AU Bell, Thomas W.
 CS Department of Chemistry, MS216, University of Nevada, Reno, NV, 89557, USA
 SO Current Opinion in Chemical Biology (1998), 2(6), 711-716
 CODEN: COCBF4; ISSN: 1367-5931
 PB Current Biology Publications
 DT Journal; General Review
 LA English
 CC 6-0 (General Biochemistry)
 AB A review with 38 refs. Recent advances in the understanding of biol. transport and in the design of artificial transport systems have resulted from the structural elucidation of the K⁺ ion channel and from synthesis of artificial receptors for cations and anions, as well as neutral and zwitterionic organic mols. Sensors, gated carriers, and self-assembling capsules and nanotubes are all important offsprings of current efforts to mimic natural transport across biomembranes.
 ST review biol transport carrier channel model
 IT Biosensors
 Nanotubes
 (carrier- and channel-mediated biol. transport and design of artificial transport systems)
 IT Potassium channel
 RL: BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process)
 (carrier- and channel-mediated biol. transport and design of artificial transport systems)
 IT Receptors
 RL: BPR (Biological process); BSU (Biological study, unclassified); SPN (Synthetic preparation); BIOL (Biological study); PREP (Preparation); PROC (Process)
 (carrier- and channel-mediated biol. transport and design of artificial transport systems)
 IT Biological transport
 (carrier-mediated; carrier- and channel-mediated biol. transport and design of artificial transport systems)
 IT Biological transport
 (channel-mediated; carrier- and channel-mediated biol. transport and design of artificial transport systems)
 IT Transport properties
 (ionic; carrier- and channel-mediated biol. transport and design of artificial transport systems)

RE.CNT 38 THERE ARE 38 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Anon; Chemosensors of Ion and Molecule Recognition. NATO ASI Series 1997
- (2) Bakker, E; Chem Rev 1997, V97, P3083 HCAPLUS
- (3) Bell, T; J Org Chem 1998, V63, P2232 HCAPLUS
- (4) Boerrigter, H; J Org Chem 1998, V63, P4174 HCAPLUS
- (5) Conn, M; Chem Rev 1997, V97, P1647 HCAPLUS
- (6) Cui, C; J Phys Chem A 1998, V102, P1119 HCAPLUS
- (7) de Mendoza, J; Chem Eur J 1998, V4, P1373 HCAPLUS
- (8) Doyle, D; Science 1998, V280, P69 HCAPLUS
- (9) Eisenberg, B; Accounts Chem Res 1998, V31, P117 HCAPLUS
- (10) Fyles, T; Curr Opin Chem Biol 1997, V1, P497 HCAPLUS
- (11) Hartgerink, J; Chem Eur J 1998, V4, P1367 HCAPLUS
- (12) Hirayama, H; J Membr Sci 1998, V139, P109 HCAPLUS
- (13) Jiwan, J; J Photochem Photobiol A - Chem 1998, V116, P127
- (14) Karle, I; J Am Chem Soc 1998, V120, P6903 HCAPLUS
- (15) Kim, H; J Am Chem Soc 1998, V120, P4417 HCAPLUS
- (16) Kimura, A; Chem Pharm Bull 1997, V45, P431 HCAPLUS
- (17) Lamb, J; Separ Sci Technol 1997, V32, P2749 HCAPLUS
- (18) Ma, J; Chem Rev 1997, V97, P1303 HCAPLUS
- (19) MacKinnon, R; Science 1998, V280, P106 HCAPLUS
- (20) Maisterrena, B; J Membr Sci 1997, V134, P85
- (21) Marchand, A; Tetrahedron Lett 1998, V39, P1861 HCAPLUS

L65 ANSWER 16 OF 35 HCAPLUS COPYRIGHT ACS on STN

AN 1998:602481 HCAPLUS
 DN 129:267168
 ED Entered STN: 23 Sep 1998
 TI Silver-filled carbon **nanotubes** used as spectroscopic enhancers
 AU Garcia-Vidal, F. J.; Pitarke, J. M.; Pendry, J. B.
 CS Facultad de Ciencias, Departamento de Fisica Teorica de la Materia
 Condensada, Universidad Autonoma de Madrid, Madrid, 28049, Spain
 SO Physical Review B: Condensed Matter and Materials Physics (1998), 58(11),
 6783-6786
 CODEN: PRBMDO; ISSN: 0163-1829
 PB American Physical Society
 DT Journal
 LA English
 CC 73-2 (Optical, Electron, and Mass Spectroscopy and Other Related
 Properties)
 Section cross-reference(s): 76
 AB The authors analyze from a theor. point of view the optical properties of arrays of C
nanotubes filled with Ag. Dependence of these properties on the different parameters involved
 was studied using a transfer matrix formalism able to work with tensor-like dielec. functions
 and including the full electromagnetic coupling between the **nanotubes**. These structures
 exhibit very strong linear optical response and hence could be used as spectroscopic enhancers
 or **chemical sensors** in the visible range. Very localized surface plasmons, created by the
 electromagnetic interaction between the capped Ag cylinders, are responsible for this
 enhancing ability. Enhancements of up to 106 in the Raman signal of mols. absorbed on these
 arrays could be obtained.
 ST silver filled carbon **nanotube** spectroscopic enhancer
 IT **Nanotubes**
 RL: DEV (Device component use); PRP (Properties); USES (Uses)
 (carbon; silver-filled carbon **nanotubes** used as spectroscopic
 enhancers)
 IT Surface plasmon
 (localized; silver-filled carbon **nanotubes** used as
 spectroscopic enhancers)
 IT Dielectric function
 Optical properties
 Optical reflection
 Sensors
 (silver-filled carbon **nanotubes** used as spectroscopic
 enhancers)
 IT Raman spectroscopy
 (silver-filled carbon **nanotubes** used as spectroscopic
 enhancers and their applications)
 IT 7440-22-4, Silver, properties
 RL: DEV (Device component use); OCU (Occurrence, unclassified); PRP
 (Properties); OCCU (Occurrence); USES (Uses)
 (silver-filled carbon **nanotubes** used as spectroscopic
 enhancers)

RE.CNT 25 THERE ARE 25 CITED REFERENCES AVAILABLE FOR THIS RECORD
 RE

- (1) Ajayan, P; Nature (London) 1993, V361, P333 HCAPLUS
- (2) Ajayan, P; Rep Prog Phys 1997, V60, P1025 HCAPLUS
- (3) Ajayan, P; Science 1994, V265, P1212 HCAPLUS
- (4) Andres, R; Science 1996, V273, P1690 HCAPLUS
- (5) Collier, C; Science 1997, V277, P1978 HCAPLUS
- (6) de Heer, W; Science 1995, V268, P845 HCAPLUS
- (7) Dujardin, E; Science 1994, V265, P1850 HCAPLUS
- (8) Fleischmann, M; Chem Phys Lett 1974, V26, P163 HCAPLUS
- (9) Freeman, R; Science 1995, V267, P1629 HCAPLUS
- (10) Garcia-Vidal, F; Phys Rev Lett 1996, V77, P1163 HCAPLUS
- (11) Garcia-Vidal, F; Phys Rev Lett 1997, V78, P4289 HCAPLUS
- (12) Garcia-Vidal, F; Prog Surf Sci 1995, V50, P55 HCAPLUS
- (13) Iijima, S; Nature (London) 1991, V354, P56 HCAPLUS
- (14) Kusunoki, M; Appl Phys Lett 1997, V71, P2620 HCAPLUS
- (15) Lucas, A; Phys Rev B 1994, V49, P2888 HCAPLUS
- (16) Mirkin, C; Nature (London) 1996, V382, P607 HCAPLUS
- (17) Moskovits, M; Rev Mod Phys 1985, V57, P783 HCAPLUS

L19 ANSWER 5 OF 5 HCAPLUS COPYRIGHT ACS on STN

AN 1998:524471 HCAPLUS

ED Entered STN: 21 Aug 1998

TI Liposomes as nanosensors in a biological environment.

AU Rosenzweig, Zeev; McNamara, Kerry P.

CS DEPARTMENT CHEMISTRY, UNIVERSITY NEW ORLEANS, New Orleans, LA, 70148, USA

SO Book of Abstracts, 216th ACS National Meeting, Boston, August 23-27

(1998), ANYL-035 Publisher: American Chemical Society, Washington, D. C.

CODEN: 66KYA2

DT Conference; Meeting Abstract

LA English

AB Liposomes have been frequently used for controlled release in drug delivery applications. Taking advantage of their small size (50-100 nm) and their ability to readily penetrate into cells we demonstrate the use of liposomes encapsulating environmentally sensitive fluorescent dyes as intracellular **nanobiosensors**. Liposomes that are constructed from polymerizable phospholipids exhibit higher stability with respect to dye leaking compared to liposomes that are constructed from typical phospholipids such as egg phosphatidylcholine. The study focuses on monitoring intracellular oxygen levels with individual liposomes encapsulating the oxygen sensitive fluorescence indicator ruthenium tris phenanthroline.

L56 ANSWER 3 OF 4 HCAPLUS COPYRIGHT ACS on STN

AN 1998:499472 HCAPLUS

DN 129:250582

ED Entered STN: 12 Aug 1998

TI Covalently-Functionalized Single-Walled Carbon Nanotube
Probe Tips for Chemical Force Microscopy

AU Wong, Stanislaus S.; Woolley, Adam T.; Joselevich, Ernesto; Cheung, Chin
Li; Lieber, Charles M.

CS Department of Chemistry and Chemical Biology, Harvard University,
Cambridge, MA, 02138, USA

SO Journal of the American Chemical Society (1998), 120(33), 8557-8558
CODEN: JACSAT; ISSN: 0002-7863

PB American Chemical Society

DT Journal

LA English

CC 66-3 (Surface Chemistry and Colloids)

AB A covalent modification of single-walled carbon nanotubes (SWCNs) is reported for creating high-resolution, chemical-sensitive probe microscopy tips. Carboxylic acid groups at the open ends of SWCNs were coupled to amines to create addnl. probes with basic or hydrophobic functionality. Force titrns. recorded between the ends of the SWNT tips and hydroxy-terminated self-assembled monolayers (SAMs) confirmed the chemical sensitivity and robustness of these SWNT tips. Images recorded on patterned SAM and partial bilayer surfaces have demonstrated chemical sensitive imaging with nanometer-scale resolution. These studies show that well-defined covalent chemical can be exploited to create functionalized SWNT probes that have the potential for true mol.-resolution, chemical sensitive imaging.

IT Scanning force microscopes
(tips; covalently functionalized single-walled carbon nanotube
probe tips for chemical force microscopy)

IT 7440-44-0, Carbon, uses
RL: DEV (Device component use); USES (Uses)
(covalently functionalized single-walled carbon nanotube
probe tips for chemical force microscopy)

RE.CNT 26 THERE ARE 26 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE

- (1) Akari, S; Adv Mater 1995, V7, P549 HCAPLUS
- (2) Bodanszky, M; The Practice of Peptide Synthesis, 2nd ed 1994
- (3) Dai, H; Nature 1996, V384, P147 HCAPLUS
- (4) Evans, J; J Electroanal Chem 1977, V80, P409 HCAPLUS
- (5) Finot, M; J Am Chem Soc 1997, V119, P8564 HCAPLUS
- (6) Frisbie, C; Science 1994, V265, P2071 HCAPLUS
- (7) Giles, M; Anal Biochem 1990, V184, P244
- (8) Green, J; J Phys Chem 1995, V99, P10960
- (9) Hiura, H; Adv Mater 1995, V7, P275 HCAPLUS
- (10) Hu, K; Langmuir 1997, V13, P5114 HCAPLUS
- (11) March, J; Advanced Organic Chemistry 1992
- (12) Marti, A; Langmuir 1995, V11, P4632 HCAPLUS
- (13) McKendry, R; Nature 1998, V391, P566 HCAPLUS
- (14) Noy, A; Annu Rev Mater Sci 1997, V27, P381 HCAPLUS
- (15) Noy, A; J Am Chem Soc 1995, V117, P7943 HCAPLUS
- (16) Noy, A; Langmuir 1998, V14, P1508 HCAPLUS
- (17) Senden, T; J Colloids Surf, A 1995, V94, P29 HCAPLUS
- (18) Sinniah, S; J Am Chem Soc 1996, V118, P8925 HCAPLUS
- (19) Thess, A; Science 1996, V273, P483 HCAPLUS
- (20) Thomas, R; J Am Chem Soc 1995, V117, P3830 HCAPLUS
- (21) van der Vegte, E; J Phys Chem 1997, V101, P9563 HCAPLUS
- (22) Vezenov, D; J Am Chem Soc 1997, V119, P2006
- (23) Wandass, J; J Electrochem Soc 1987, V134, P2734 HCAPLUS
- (24) Williams, J; Langmuir 1996, V12, P1291 HCAPLUS
- (25) Wong, S; J Am Chem Soc 1998, V120, P603 HCAPLUS
- (26) Wong, S; Nature 1998, V394, P52 HCAPLUS

L56 ANSWER 4 OF 4 HCAPLUS COPYRIGHT ACS on STN

AN 1998:447265 HCAPLUS

DN 129:167339

ED Entered STN: 20 Jul 1998

TI Covalently functionalized **nanotubes** as nanometer-sized
probes in chemistry and biology

AU Wong, Stanislaus S.; Joselevich, Ernesto; Woolley, Adam T.; Cheung, Chhin
Li; Lieber, Charles M.

CS Dep. Chem. and Chem. Biol., Harvard Univ., Cambridge, MA, 02138, USA

SO Nature (London) (1998), 394(6688), 52-55

CODEN: NATUAS; ISSN: 0028-0836

PB Macmillan Magazines

AB A review with 25 refs. C **nanotubes** combine a range of properties that make them well suited for use as probe tips in applications such as atomic force microscopy (AFM). Their high aspect ratio, for example, opens up the possibility of probing the deep crevices that occur in microelectronic circuits, and the small effective radius of **nanotube** tips significantly improves the lateral resolution beyond what can be achieved using com. Si tips. Another characteristic feature of **nanotubes** is their ability to buckle elastically, which makes them very robust while limiting the maximum force that is applied to delicate organic and biol. samples. Earlier studies into the performance of **nanotubes** as scanning probe microscopy tips have focused on topog. imaging, but a potentially more significant issue is the question of whether **nanotubes** can be modified to create probes that can sense and manipulate matter at the mol. level. **Nanotube** tips with the capability of chemical and biol. discrimination can be created with acidic functionality and by coupling basic or hydrophobic functionalities or biomol. probes to the carboxyl groups that are present at the open tips ends. The authors used these modified **nanotubes** as AFM tips to titrate the acid and base groups, to image patterned samples based on mol. interactions, and to measure the binding force between single protein-ligand pairs. As carboxyl groups are readily derivatized by a variety of reactions, the preparation of a wide range of functionalized **nanotube** tips should be possible, thus creating mol. probes with potential applications in many areas of chemical and biol.

ST review functionalized **nanotube probe chem**
biol

IT Atomic force microscopy

Nanotubes

Scanning probe microscopy

(covalently functionalized **nanotubes** as nanometer-sized
probes in chemical and biol.)

RE.CNT 25 THERE ARE 25 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE

- (1) Binnig, G; Phys Rev Lett 1986, V56, P930
- (2) Bodanszky, M; The Practice of Peptide Synthesis 2nd edn 1994
- (3) Bustamante, C; Curr Opin Struct Biol 1997, V7, P709 HCAPLUS
- (4) Dai, H; Nature 1996, V384, P147 HCAPLUS
- (5) Evans, J; J Electroanal Chem 1977, V80, P409 HCAPLUS
- (6) Florin, E; Science 1994, V264, P415 HCAPLUS
- (7) Frisbie, C; Science 1994, V265, P2071 HCAPLUS
- (8) Giles, M; Anal Biochem 1990, V184, P244
- (9) Hansma, P; Appl Phys Lett 1994, V64, P1738 HCAPLUS
- (10) Hiura, H; Adv Mater 1995, V7, P275 HCAPLUS
- (11) Keller, D; Nature 1996, V384, P111 HCAPLUS
- (12) Kumar, A; Langmuir 1994, V10, P1498 HCAPLUS
- (13) Lee, G; Langmuir 1994, V10, P354 HCAPLUS
- (14) Livnah, O; Proc Natl Acad Sci USA 1993, V90, P5076 HCAPLUS
- (15) March, J; Advanced Organic Chemistry 1992
- (16) Marti, A; Langmuir 1995, V11, P4632 HCAPLUS
- (17) McKendry, R; Nature 1998, V391, P566 HCAPLUS
- (18) Noy, A; Annu Rev Mater Sci 1997, V27, P381 HCAPLUS
- (19) Noy, A; Langmuir 1998, V14, P1508 HCAPLUS
- (20) Thess, A; Science 1996, V273, P483 HCAPLUS
- (21) Vezenov, D; J Am Chem Soc 1997, V119, P2006
- (22) Wandass, J; J Electrochem Soc 1987, V134, P2734 HCAPLUS
- (23) Wong, E; Science 1997, V277, P1971 HCAPLUS
- (24) Wong, S; J Am Chem Soc 1998, V120, P603 HCAPLUS
- (25) Wong, S; J Am Chem Soc submitted

L32 ANSWER 66 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 1998:423846 HCAPLUS

DN 129:182575

ED Entered STN: 10 Jul 1998

TI Ion beam synthesis of silicon-based materials

AU Mantl, S.; Hollander, B.; Lenssen, D.; Loken, M.

CS Inst. Schicht-und Ionentech., Forschungszentrum Julich, Julich, D-52425, Germany

SO Materials Chemistry and Physics (1998), 54(1-3), 280-285

CODEN: MCHPDR; ISSN: 0254-0584

PB Elsevier Science S.A.

AB Ion beam synthesis (IBS) is a useful technique to fabricate silicon-based materials. The authors will discuss the different mechanisms of IBS for materials forming solid solns. or stoichiometric compds. An interesting completely miscible system is Si-Ge because epitaxial Si_{1-x}Ge_x layers will be used for future microelectronic devices. As an example for a stoichiometric compound the authors have studied a metallic silicide, CoSi₂, which is a favorite material for contacts and interconnects of deep submicron transistors and which is structurally compatible with silicon allowing epitaxial layer formation. Also, the authors show the synthesis of a ternary silicide compound Co_{1-x}Pd_xSi₂. One of the key advantages of IBS is the possibility of direct patterning of structures using an implantation mask. The authors studied the dimensional limits of the fabrication of epitaxial CoSi₂ nanowires in Si(100). These metallic wires with diams. ≥170nm show quantum effects of the elec. transport by the observation of weak localization effects. The usefulness for applications of ion beam synthesized buried CoSi₂ layers in silicon is demonstrated by the realization of an ultrafast vertical metal/semiconductor/metal photodetector.

ST ion beam synthesis silicon material microelectronics

IT Semiconductor materials

(nanowires; ion beam synthesis of silicon-based materials for microelectronic devices)

IT 7440-21-3P, Silicon, properties 11148-21-3P 12017-12-8P, Cobalt silicide (CoSi₂) 211567-39-4P, Cobalt palladium silicide ((Co,Pd)Si₂)

RL: PEP (Physical, engineering or chemical process); PNU (Preparation, unclassified); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)

(ion beam synthesis of silicon-based materials for microelectronic devices)

RE.CNT 22 THERE ARE 22 CITED REFERENCES AVAILABLE FOR THIS RECORD

- RE
- (1) Bergmann, G; Phys Rep 1984, V107(1), P2
 - (2) Colinge, J; Silicon-on-Insulator Technology Materials to VLSI 1991, P1
 - (3) Hermanns, J; Appl Phys Lett 1993, V62, P2507
 - (4) Hollander, B; Proceedings of the 9th International Conference on Ion Beam Modification of Materials 1995, P947
 - (5) Iyer, S; Microelectr Eng 1992, V19, P351 HCAPLUS
 - (6) Kobayashi, N; Appl Surf Sci 1996, V100-101, P498
 - (7) Maex, K; Mater Sci Eng R 1993, V11, P53
 - (8) Mantl, S; Appl Phys Lett 1992, V61, P267 HCAPLUS
 - (9) Mantl, S; Mater Sci Rep 1992, V8, P1
 - (10) Mantl, S; Nucl Instr Meth B 1995, V106, P355 HCAPLUS
 - (11) Osten, H; J Cryst Growth 1995, V150, P931 HCAPLUS
 - (12) Presting, H; Mater Res Soc Symp Proc 1995, V379, P417 HCAPLUS
 - (13) Radermacher, K; Phys Rev B 1993, V48, P8002 HCAPLUS
 - (14) Reiss, S; Nucl Instr Meth B 1995, V102, P256 HCAPLUS
 - (15) Santhanam, P; Phys Rev B 1987, V35, P3188 HCAPLUS
 - (16) Schaffler, F; Semicond Sci Technol 1992, V7, P260
 - (17) Tisch, U; Nucl Instr Meth B 1997, V127-128, P324
 - (18) Trinkaus, H; Nucl Instr Meth B 1993, V80-81, P862
 - (19) Volz, K; Nucl Instr Meth B 1997, V127-128, P355
 - (20) Wahl, U; Nucl Instr Meth B 1997, V127-128, P311
 - (21) White, A; Appl Phys Lett 1987, V50, P95 HCAPLUS
 - (22) Zimmerman, N; Appl Phys Lett 1993, V62, P387 HCAPLUS

L62 ANSWER 12 OF 14 HCAPLUS COPYRIGHT ACS on STN

AN 1998:69441 HCAPLUS
 DN 128:138151
 ED Entered STN: 06 Feb 1998
 TI Diffusion-Limited Size-Selective Ion Sensing Based on SAM-Supported Peptide **Nanotubes**. [Erratum to document cited in CA128:32011]
 AU Motesharei, Kianoush; Ghadiri, M. Rzea
 CS Departments of Chemistry Molecular Biology, Scripps Research Institute, La Jolla, CA, 92037, USA
 SO Journal of the American Chemical Society (1998), 120(6), 1347
 CODEN: JACSAT; ISSN: 0002-7863
 PB American Chemical Society
 DT Journal
 LA English
 CC 9-1 (Biochemical Methods)
 Section cross-reference(s): 79
 AB On page 11311, Table 1, the capacitance values for substrate surfaces 3 and 4 should read 2.70 and 1.22, resp.
 ST erratum diffusion limited size selective Ion; diffusion limited size selective Ion erratum; limited size selective Ion sensing erratum; Self assembled monolayer supported peptide erratum; assembled monolayer supported peptide **nanotube** erratum; SAM supported peptide **nanotubes** erratum
 IT IR spectroscopy
 (Fourier-transform, grazing angle FTIR spectroscopy; structural properties of monolayer-supported peptide **nanotubes** by grazing angle FTIR spectroscopy (Erratum))
 IT **Nanotubes**
 (cyclic peptide **nanotubes**; diffusion-limited size-selective ion sensing based on SAM-supported peptide **nanotubes** (Erratum))
 IT Cyclic voltammetry
 (cyclic voltammograms of SAMs in electroactive solns. (Erratum))
 IT Peptides, uses
 RL: DEV (Device component use); USES (Uses)
 (cyclic, cyclic peptide **nanotubes**; diffusion-limited size-selective ion sensing based on SAM-supported peptide **nanotubes** (Erratum))
 IT Diffusion
 Ions
 Self-assembled monolayers
 Sensors
 Size effect
 (diffusion-limited size-selective ion sensing based on SAM-supported peptide **nanotubes** (Erratum))
 IT **Biosensors**
 (diffusion-limited size-selective; diffusion-limited size-selective ion sensing based on SAM-supported peptide **nanotubes** (Erratum))
 IT Electric impedance
 (elec. impedance spectroscopy for ion transport activity in SAM-supported peptide **nanotubes** (Erratum))
 IT Diffusion
 (ionic, size-selective limited diffusion; diffusion-limited size-selective ion sensing based on SAM-supported peptide **nanotubes** (Erratum))
 IT Adsorbed monolayers
 (self-assembled monolayers of organosulfurs on gold film; diffusion-limited size-selective ion sensing based on SAM-supported peptide **nanotubes** (Erratum))
 IT 1844-09-3, Octadecyl sulfide 7440-21-3, Silicon, uses 7440-57-5, Gold, uses 199737-34-3
 (diffusion-limited size-selective ion sensing based on SAM-supported peptide **nanotubes** (Erratum))
 IT 112-55-0, 1-Dodecanethiol
 RL: DEV (Device component use); USES (Uses)
 (self-assembled monolayer; diffusion-limited size-selective ion sensing based on SAM-supported peptide **nanotubes** (Erratum))

L32 ANSWER 71 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 1998:10072 HCAPLUS
 DN 128:172559
 ED Entered STN: 09 Jan 1998
 TI Microscopic patterning of oriented mesoscopic silica through guided growth
 AU Trau, M.; Yao, N.; Kim, E.; Xia, Y.; Whitesides, G. M.; Aksay, I. A.
 CS Dep. Chem. Eng., Princeton Mater. Inst., Princeton Univ., Princeton, NJ,
 08544-5263, USA
 SO Nature (London) (1997), 390(6661), 674-676
 CODEN: NATUAS; ISSN: 0028-0836
 PB Macmillan Magazines
 DT Journal
 LA English
 CC 66-4 (Surface Chemistry and Colloids)
 AB The supramol. assembly of surfactant mols. at a solid-liquid interface can produce tubular structures with diams. of .apprx.10 nm, which can be used for the templated polymerization of mesoporous SiO₂ thin films. The orientation of the tubules depends primarily on the nature of the substrate-surfactant interaction. These nanostructured films hold much promise for applications such as their use as oriented nanowires, sensor/actuator arrays and optoelectronic devices. But a method of patterning the tubules and orienting them into designed arrangements is required for many of these possibilities to be realized. Here the authors describe a method that allows the direction of growth of these tubules to be guided by infiltrating a reaction fluid into the microcapillaries of a mold in contact with a substrate. An elec. field applied tangentially to the surface within the capillaries induces electroosmotic flow, and also enhances the rates of SiO₂ polymerization around the tubules by localized Joule heating. After removal of the mold, patterned bundles of oriented nanotubules remain on the surface. This method permits the formation of oriented mesoporous channels on a nonconducting substrate with an arbitrary microscopic pattern.
 ST microscopic patterning oriented mesoscopic silica surfactant
 IT Porous materials
 (mesoporous; microscopic patterning of oriented mesoscopic silica through guided growth of surfactant mols. on plastic substrate)
 IT Adsorption
 (microscopic patterning of oriented mesoscopic silica through guided growth by adsorption of surfactant)
 IT 78-10-4, Tetraethoxysilane 112-02-7, Cetyltrimethylammonium chloride
 RL: PEP (Physical, engineering or chemical process); PROC (Process)
 (microscopic patterning of oriented mesoscopic silica through guided growth by adsorption of surfactant containing)
 IT 7631-86-9, Silica, processes
 RL: PEP (Physical, engineering or chemical process); PROC (Process)
 (microscopic patterning of oriented mesoscopic silica through guided growth of surfactant mols. on plastic substrate)
 RE.CNT 26 THERE ARE 26 CITED REFERENCES AVAILABLE FOR THIS RECORD
 RE
 (1) Aksay, I; Science 1996, V273, P892 HCAPLUS
 (2) Amundson, K; Macromolecules 1991, V24, P6546 HCAPLUS
 (3) Broers, A; Appl Phys Lett 1978, V33, P392 HCAPLUS
 (4) Chou, S; Science 1996, V272, P85 HCAPLUS
 (5) Early, K; Microelectron Eng 1990, V11, P317 HCAPLUS
 (6) Fendler, J; Chem Mater 1996, V8, P1616 HCAPLUS
 (7) Fischer, P; Appl Phys Lett 1993, V62, P2989 HCAPLUS
 (8) Flanders, D; Appl Phys Lett 1980, V36, P93 HCAPLUS
 (9) Iler, R; The Colloid Chemistry of Silica and Silicates 1955, P36
 (10) Israelachvili, J; Intermolecular and Surface Forces 1992, P374
 (11) Kim, E; Nature 1995, V376, P581 HCAPLUS
 (12) Kramer, N; Appl Phys Lett 1995, V66, P1325 HCAPLUS
 (13) Kresge, C; Nature 1992, V359, P710 HCAPLUS
 (14) Li, W; Science 1996, V274, P1701 HCAPLUS
 (15) Linder, E; J Chem Soc Faraday Trans 1993, V89, P361
 (16) Lu, Y; Nature 1997, V389, P364 HCAPLUS
 (17) Manne, S; Langmuir 1994, V10, P4409 HCAPLUS
 (18) Manne, S; Science 1995, V270, P1480 HCAPLUS
 (19) McCord, M; J Vac Sci Technol B 1986, V4, P86
 (20) Morkved, T; Science 1996, V273, P931 HCAPLUS
 (21) Russel, W; Colloidal Dispersions 1989, P212
 (22) Sakai, H; J Phys Chem 1996, V99, P11896

L62 ANSWER 13 OF 14 HCAPLUS COPYRIGHT ACS on STN

AN 1997:740809 HCAPLUS

DN 128:32011

ED Entered STN: 26 Nov 1997

TI Diffusion-Limited Size-Selective Ion Sensing Based on SAM-Supported Peptide **Nanotubes**

AU Motesharei, Kianoush; Ghadiri, M. Reza

CS Departments of Chemistry Molecular Biology, Scripps Research Institute, La Jolla, CA, 92037, USA

SO Journal of the American Chemical Society (1997), 119(46), 11306-11312

CODEN: JACSAT; ISSN: 0002-7863

PB American Chemical Society

DT Journal

LA English

CC 9-1 (Biochemical Methods)

Section cross-reference(s): 79

AB An approach for the construction of diffusion-limited size-selective sensors is described based on the self-assembly of cyclic peptides into tubular channels in organosulfur self-assembled monolayers on gold films. An eight-residue cyclic peptide of alternating units of D-Leu and L-Trp amino acid residues was incorporated into monolayers of dodecanethiol and octadecyl sulfide and shown to adopt highly oriented tubular structures under specified adsorption conditions. The structural properties of monolayer-supported peptide **nanotubes** have been analyzed by grazing angle FTIR spectroscopy and their selective ion transport activities by cyclic voltammetry and impedance spectroscopy.

ST diffusion limited size selective Ion sensing; Self assembled monolayer supported peptide **nanotube**; SAM supported peptide **nanotubes**

IT IR spectroscopy

(Fourier-transform, grazing angle FTIR spectroscopy; structural properties of monolayer-supported peptide **nanotubes** by grazing angle FTIR spectroscopy)

IT **Nanotubes**

(cyclic peptide **nanotubes**; diffusion-limited size-selective ion sensing based on SAM-supported peptide **nanotubes**)

IT Cyclic voltammetry

(cyclic voltammograms of SAMs in electroactive solns.)

IT Peptides, uses

(cyclic, cyclic peptide **nanotubes**; diffusion-limited size-selective ion sensing based on SAM-supported peptide **nanotubes**)

IT Self-assembled monolayers

Size effect

(diffusion-limited size-selective ion sensing based on SAM-supported peptide **nanotubes**)

IT Ions

(diffusion-limited size-selective ion sensing based on SAM-supported peptide **nanotubes**)

IT **Biosensors**

Diffusion

Sensors

(diffusion-limited size-selective; diffusion-limited size-selective ion sensing based on SAM-supported peptide **nanotubes**)

IT Electric impedance

(elec. impedance spectroscopy for ion transport activity in SAM-supported peptide **nanotubes**)

IT Diffusion

(ionic, size-selective limited diffusion; diffusion-limited size-selective ion sensing based on SAM-supported peptide **nanotubes**)

IT Adsorbed monolayers

(self-assembled monolayers of organosulfurs on gold film; diffusion-limited size-selective ion sensing based on SAM-supported peptide **nanotubes**)

IT 7440-21-3, Silicon, uses 7440-57-5, Gold, uses 199737-34-3

RL: DEV (Device component use); USES (Uses)

(diffusion-limited size-selective ion sensing based on SAM-supported peptide **nanotubes**)

L62 ANSWER 14 OF 14 HCAPLUS COPYRIGHT ACS on STN

AN 1997:618265 HCAPLUS

DN 127:275017

ED Entered STN: 27 Sep 1997

TI **Graphitic nanotubes in luminescence assays**

IN Massey, Richard J.; Martin, Mark T.; Dong, Liwen; Lu, Ming; Fischer, Alan; Jameison, Fabian; Liang, Pam; Hoch, Robert; Leland, Jonathon K.

PA Igen, Inc., USA

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 9733176	A1	19970912	WO 1997-US3653	19970305 <--
US 5866434	A	19990202	US 1996-611347	19960306 <--
AU 9720737	A1	19970922	AU 1997-20737	19970305 <--
AU 724509	B2	20000921		
EP 885393	A1	19981223	EP 1997-908967	19970305 <--
JP 2001507787	T2	20010612	JP 1997-531989	19970305 <--
IL 125985	A1	20020725	IL 1997-125985	19970305 <--
RU 2189043	C2	20020910	RU 1998-116668	19970305 <--
PRAI US 1996-611347	A	19960306	<--	
US 1994-352400	A2	19941208	<--	
WO 1997-US3653	W	19970305	<--	

AB **Graphitic nanotubes, which include tubular fullerenes** (commonly called "buckytubes") and fibrils, which are functionalized by chemical substitution, are used as solid supports in electrogenerated chemiluminescence assays. The graphitic **nanotubes** are chemical modified with functional group biomols. prior to use in an assay. Association of electrochemiluminescent ruthenium complexes with the functional group biomol.-modified **nanotubes** permits detection of mols. including nucleic acids, antigens, enzymes, and enzyme substrates by multiple formats.

IT Separation

(affinity; graphitic **nanotubes** in luminescence assays of biomols. and biopolymers)

IT **Nanotubes****Nanotubes**

RL: ARG (Analytical reagent use); RCT (Reactant); ANST (Analytical study); RACT (Reactant or reagent); USES (Uses)
(carbon fibers; graphitic **nanotubes** in luminescence assays of biomols. and biopolymers)

IT **Nanotubes**

RL: ARG (Analytical reagent use); RCT (Reactant); ANST (Analytical study); RACT (Reactant or reagent); USES (Uses)
(carbon; graphitic **nanotubes** in luminescence assays of biomols. and biopolymers)

IT Optical detectors

(chemiluminescence, electro-; graphitic **nanotubes** in luminescence assays of biomols. and biopolymers)

IT Luminescence, chemiluminescence

(detectors, electro-; graphitic **nanotubes** in luminescence assays of biomols. and biopolymers)

IT Chemiluminescence spectroscopy

(electro-; graphitic **nanotubes** in luminescence assays of biomols. and biopolymers)

IT Immunoassay

(electrochemiluminescence; graphitic **nanotubes** in luminescence assays of biomols. and biopolymers)

IT **Biosensors**

(enzymic; graphitic **nanotubes** in luminescence assays of biomols. and biopolymers)

IT Avidins

Polyoxyalkylenes, preparation

Proteins, general, preparation

RL: ARG (Analytical reagent use); SPN (Synthetic preparation); ANST (Analytical study); PREP (Preparation); USES (Uses)
(graphitic **nanotube** conjugates; graphitic **nanotubes** in luminescence assays of biomols. and biopolymers)

IT Biochemical molecules

Biosensors

Biotinylation

L65 ANSWER 24 OF 35 HCAPLUS COPYRIGHT ACS on STN

AN 1997:158320 HCAPLUS
ED Entered STN: 10 Mar 1997
TI Self-assembly of cyclic peptide based **nanotubes** on gold and
silicon dioxide surfaces
AU Buriak, Jillian M.; Ghadiri, M. Reza
CS Department Chemistry, Scripps Research Institute, La Jolla, CA, 92037, USA
SO Book of Abstracts, 213th ACS National Meeting, San Francisco, April 13-17
(1997), INOR-853 Publisher: American Chemical Society, Washington, D. C.
CODEN: 64AOAA
DT Conference; Meeting Abstract
LA English
AB Cyclic peptides with alternating D-,L- chirality around the ring self-assemble into hollow,
hydrogen-bonded **nanotube** structures. Functionalization of the amide nitrogens on one face of
the cyclic peptides with alkyl thiols and alkyl chlorosilanes allows binding of the peptide to
gold and silicon dioxide surfaces, resp. Bidentate binding of the cyclic peptide to the
surface, followed by self-assembly of one or more appropriately functionalized cyclic
peptides, yields **nanotubes** perpendicular to the surface. Application of these **nanotube** arrays
as **biosensors** will be discussed.

L32 ANSWER 75 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 1997:151861 HCAPLUS
DN 126:261049
ED Entered STN: 08 Mar 1997
TI Towards amperometric **immunosensor** devices
AU Tiefenauer, Louis X.; Kossek, Sebastian; Padeste, Celestino; Thiebaud, Pierre
CS Micro- and Nanostructures Laboratory, Paul scherrer Institut, Villigen PSI, CH-5235, Switz.
SO Biosensors & Bioplectronics (1997), 12(3), 213-223
CODEN: BBIOE4; ISSN: 0956-5663
PB Elsevier
DT Journal
LA English
CC 9-1 (Biochemical Methods)
AB In contrast to optical **immunosensors**, the electrochem. **detection** of an immunoanal. reaction does require a labeling, but allows an easier discrimination of specific and non-specific binding. We present a concept and first results for a multivalent amperometric **immunosensor** system which is based on silicon technol. The capture mol. streptavidin, covalently immobilized on silica, allows the immobilization of biotinylated antigens at a defined d. A nanostructured gold electrode serving as a stable network of **nanowires** is expected to be beneficial for the electrochem. **detection** of bound ferrocene-labeled antibody mols. The results presented focus on site-specific immobilization of streptavidin on silica and reduction of non-specific binding of proteins.
ST amperometric **immunosensor** devices
IT Antigens
RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(Biotinylated; towards amperometric **immunosensor** devices)
IT **Biosensors**
(**immunosensors**, Amperometric; towards amperometric **immunosensor** devices)
IT Electrodes
Immobilization, biochemical
(towards amperometric **immunosensor** devices)
IT 102-54-5, Ferrocene
RL: ARG (Analytical reagent use); ANST (Analytical study); USES (Uses)
(towards amperometric **immunosensor** devices)
IT 7631-86-9, Silica, uses 9013-20-1, Streptavidin
RL: DEV (Device component use); USES (Uses)
(towards amperometric **immunosensor** devices)

L64 ANSWER 5 OF 5 HCAPLUS COPYRIGHT ACS on STN

AN 1997:77063 HCAPLUS

DN 126:86777

ED Entered STN: 03 Feb 1997

TI Probes for sensing and manipulating microscopic environments and structures

IN Baldeschwieler, John D.; Baselt, David; Unger, Mark A.; O'Connor, Stephen D.

PA California Institute of Technology, USA

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9638705	A1	19961205	WO 1996-US6777	19960513 <--
	US 5824470	A	19981020	US 1995-453958	19950530
	AU 9658575	A1	19961218	AU 1996-58575	19960513 <--
PRAI	US 1995-453958	A	19950530	<--	
	WO 1996-US6777	W	19960513	<--	

AB Probes for sensing and manipulating microscopic environments and structures, their method of preparation, and methods of use are disclosed. The invention relates especially to a **chemical** functionalized scanning **probe** tip. Probes are provided for functions beyond the imaging of microscopic surfaces, e.g., tips are provided with specific functional moieties to target and/or interact with biol. mols. in vivo or to assist in nanochem., lithog., or nanofabrication techniques. Accordingly, an object of the invention is to provide a method of preparing a probe tip functionalized with chemical moieties. Another object involves the preparation of a probe tip suitable for scanning probe microscopy comprising a single macromol. attached at its apex. Several other objects of the invention are described.

IT **Nanotubes**

RL: DEV (Device component use); USES (Uses)

(**carbon; probes** for sensing and manipulating microscopic environments and structures)

IT Peptides, reactions

RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)

(cyclic, immobilized; probes for sensing and manipulating microscopic environments and structures)

IT Alkanes, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(diazo; probes for sensing and manipulating microscopic environments and structures)

IT DNA

RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)

(double-stranded; probes for sensing and manipulating microscopic environments and structures)

IT Hydrocarbons, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(halo; probes for sensing and manipulating microscopic environments and structures)

IT Biochemical molecules

(immobilized; probes for sensing and manipulating microscopic environments and structures)

IT Biopolymers

RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)

(immobilized; probes for sensing and manipulating microscopic environments and structures)

IT Enzymes, reactions

RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)

(immobilized; probes for sensing and manipulating microscopic environments and structures)

IT Peptides, reactions

RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)

(immobilized; probes for sensing and manipulating microscopic environments and structures)

L32 ANSWER 78 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 1996:654720 HCAPLUS
 DN 125:343612
 ED Entered STN: 06 Nov 1996
 TI **Nonlithographic nano-wire arrays: Fabrication, physics, and device applications**
 AU Routkevitch, Dmitri; Tager, A. A.; Haruyama, Junji; Almawlawi, Diyaa; Moskovits, Martin; Xu, Jimmy M.
 CS Ontario Laser & Lightwave Research Centre, University Toronto, Toronto, ON, M5S 3H6, Can.
 SO IEEE Transactions on Electron Devices (1996), 43(10), 1646-1658
 CODEN: IETDAI; ISSN: 0018-9383
 PB Institute of Electrical and Electronics Engineers
 DT Journal; General Review
 LA English
 CC 76-0 (Electric Phenomena)
 AB A novel system of nanostructures is described consisting of nonlithog. produced arrays of nano-wires directly electrodeposited into porous anodic aluminum oxide templates. Using this method regular and uniform arrays of metal or semiconductor nano-wires or nano-dots can be created with diams. ranging from .apprx.5 nm to several hundred nanometers and with areal pore densities in the .apprx.109-1011 cm⁻² range. We report on the present state of their fabrication, properties, and prospective device applications. Results of X-ray diffraction, Raman and magnetic measurements on metal (Ni, Fe) and semiconductor (CdS, CdSe, CdS_xSe_{1-x}, Cd_xZn_{1-x}S and GaAs) wires are presented. The I-V characteristics of two terminal devices made from the nano-arrays are found to exhibit room temperature periodic conductance oscillations and Coulomb-blockade like current staircases. These observations are likely associated with the ultra-small tunnel junctions that are formed naturally in the arrays. Single-electron tunneling (SET) in the presence of interwire coupling in these arrays is shown to lead to the spontaneous electrostatic polarization of the wires. **Possible device applications** such as magnetic memory or **sensors**, electroluminescent flat-panel displays, and nanoelectronic and single-electronic devices are also discussed. 40 Refs.

ST review semiconductor device electrochem deposition alumina
 IT Electrodeposition and Electroplating
 Semiconductor devices
 (electrochem. deposition techniques in fabrication of nano-wire arrays)

IT Metals, processes
 Semiconductor materials
Sensors
 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
 (electrochem. deposition techniques in fabrication of nano-wire arrays)

IT Optical imaging devices
 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
 (flat panel displays; electrochem. deposition techniques in fabrication of nano-wire arrays)

IT Tunneling
 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
 (single-electron; electrochem. deposition techniques in fabrication of nano-wire arrays)

IT Memory devices
 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
 (magnetic, electrochem. deposition techniques in fabrication of nano-wire arrays)

IT Wire
 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
 (nanowire, electrochem. deposition techniques in fabrication of nano-wire arrays)

IT 1344-28-1, Alumina, processes
 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
 (porous substrates; electrochem. deposition techniques in fabrication of nano-wire arrays)

L58 ANSWER 10 OF 10 HCAPLUS COPYRIGHT ACS on STN
AN 1996:415735 HCAPLUS
ED Entered STN: 16 Jul 1996
TI Molecular dynamics of ion-transport and water diffusion in self-assembling peptide **nanotubes**.
AU Bashford, D.; Engels, M.; Ghadiri, M. R.
CS Scripps Research Institute, La Jolla, CA, 92037, USA
SO Book of Abstracts, 212th ACS National Meeting, Orlando, FL, August 25-29 (1996), PHYS-323 Publisher: American Chemical Society, Washington, D. C.
CODEN: 63BFAF
DT Conference; Meeting Abstract
LA English
AB We have performed several mol. dynamics simulations of water-filled self-assembled peptide **nanotubes**, and potential of mean force calcns. for ions in such tubes. The peptide structures consist of beta-sheet-like hydrogen-bonded stacks of flat cyclic peptides of alternating D and L amino acids. The simulations elucidate the way in which tube geometry and patterns of polar and non-polar atoms along the tube walls lead to a semi-regular structure of water in the tube, and anal. of trajectories shows a complex hopping mechanism by which transport rates reach much higher values than those of the analogous gramicidin channel. An analogy to the conductivity of n-type **semiconductors** is presented. **Nanotubes** of this kind can be synthesized in a variety of sizes, and can be designed to self-insert into membranes or covalently attach to electrode surfaces. Their differential ion-transport properties can potentially be exploited in devices such as **biosensor** arrays.

4/9/8

DIALOG(R)File 94:JICST-EPlus

© Japan Science and Tech Corp(JST). All rts. reserv.

02803916 JICST ACCESSION NUMBER: 96A0843707 FILE SEGMENT: JICST-E

Lattice Distortion with Spatial Variation of Carbon Nanotubes in
Magnetic Fields.

AJIKI H (1); ANDO T (1)

(1) University Tokyo, Tokyo

J Phys Soc Jpn, 1996, VOL.65,NO.9, PAGE.2976-2986, FIG.12, REF.33

JOURNAL NUMBER: G0509AAI ISSN NO: 0031-9015 CODEN: JUPSA

UNIVERSAL DECIMAL CLASSIFICATION: 539.124:621.315.592

LANGUAGE: English COUNTRY OF PUBLICATION: Japan

DOCUMENT TYPE: Journal

ARTICLE TYPE: Original paper

MEDIA TYPE: Printed Publication

ABSTRACT: A lattice instability of carbon nanotubes induced by a magnetic field perpendicular to the tube axis is studied in a kvp scheme. Both in-plane Kekule and out-of-plane distortions are enhanced drastically with increase of a magnetic field independent of whether a nanotube is metallic or semiconducting and magnetic flux passing through the cross section of a nanotube. The distortions become dependent on the position in the circumference direction. (author abst.)

DESCRIPTORS: carbon; molecular cluster; perturbation theory; effective mass
; crystal lattice; lattice distortion; magnetic field effect; Landau
level; semiconductivity; metallicity

BROADER DESCRIPTORS: second row element; element; carbon group element;
molecule; approximation method; mass(mechanical quantity); mechanical
quantity; lattice; strain; effect; energy level; electrical property;
property

CLASSIFICATION CODE(S): BM02060N

4/9/9

DIALOG(R)File 94:JICST-EPlus

(c) Japan Science and Tech Corp(JST). All rts. reserv.

02516855 JICST ACCESSION NUMBER: 96A0835664 FILE SEGMENT: PreJICST-E
Lattice Distortion with Spatial Variation of Carbon **Nanotubes** in

Magnetic Fields.

AJIKI H (1); ANDO T (1)

(1) University Tokyo, Tokyo

Tech Rep ISSP Ser A, 1996, NO.3167, PAGE.14p

JOURNAL NUMBER: S0273AAA ISSN NO: 0082-4798 CODEN: TISSB

LANGUAGE: English COUNTRY OF PUBLICATION: Japan

DOCUMENT TYPE: Journal

MEDIA TYPE: Printed Publication

ABSTRACT: A lattice instability of **carbon nanotubes induced by a magnetic field** perpendicular to the tube axis is studied in a k p scheme. Both in-plane Kekule and out-of-plane distortions are enhanced drastically with increase of a magnetic field independent of whether a **nanotube** is metallic or **semiconducting** and magnetic flux passing through the cross section of a **nanotube**. The distortions become dependent on the position in the circumference direction. (author abst.)

4/9/10

DIALOG(R)File 94:JICST-EPlus

(c)2005 Japan Science and Tech Corp(JST). All rts. reserv.

02487384 JICST ACCESSION NUMBER: 96A0446425 FILE SEGMENT: PreJICST-E

Carbon **Nanotubes**: Effects of Magnetic Fields on Lattice Distortions.

AJIKI H (1); ANDO T (1)

(1) University Tokyo, Tokyo

Tech Rep ISSP Ser A, 1996, NO.3112, PAGE.6p

JOURNAL NUMBER: S0273AAA ISSN NO: 0082-4798 CODEN: TISSB

LANGUAGE: English COUNTRY OF PUBLICATION: Japan

DOCUMENT TYPE: Journal

MEDIA TYPE: Printed Publication

ABSTRACT: A lattice instability is studied for carbon **nanotubes** in a magnetic field perpendicular to the tube axis in a k p approximation. A strong magnetic field dramatically enhances the distortion at the top and bottom parts of the cylinder surface for both metallic and **semiconducting nanotubes** with large circumference. (author abst.)

L32 ANSWER 22 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 2000:518228 HCAPLUS
 DN 133:246007
 ED Entered STN: 31 Jul 2000
 TI Single-electron **detector** and counter
 AU Stone, N. J.; Ahmed, H.
 CS Microelectronics Research Centre, Cavendish Laboratory, Cambridge, CB3
 OHE, UK
 SO Applied Physics Letters (2000), 77(5), 744-746
 CODEN: APPLAB; ISSN: 0003-6951
 PB American Institute of Physics
 DT Journal
 LA English
 CC 76-14 (Electric Phenomena)
 AB An electron **detector**, constructed with highly doped silicon **nanowires**, is described. It is shown that, at a temperature of 4.2 K, the presence or absence of a single excess electron on a storage node can be recognized. The **detector** can also be used to count the precise number of electrons transferred to the node.
 ST single electron **detector** silicon **nanowire**
 IT **Nanowires** (metallic)
 (electron **detectors** from highly doped silicon **nanowires**)
 IT Electron **detectors**
 (single-electron **detector** and counter)
 IT 7440-21-3, Silicon, uses
 RL: DEV (Device component use); USES (Uses)
 (electron **detectors** from highly doped silicon **nanowires**)

RE.CNT 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD
 RE

- (1) Dutta, A; Appl Phys Lett 1999, V75, P10
- (2) Field, M; Semicond Sci Technol 1996, V11, P1498 HCAPLUS
- (3) Fulton, T; Phys Rev Lett 1991, V67, P3148
- (4) Guo, L; Science 1997, V275, P649 HCAPLUS
- (5) Lafarge, P; Acad Sci, Paris 1992, V314, P883 HCAPLUS
- (6) Lafarge, P; Z Phys B: Condens Matter 1991, V85, P327
- (7) Lotkhov, S; Appl Phys Lett 1999, V75, P2665 HCAPLUS
- (8) Nakazato, K; Jpn J Appl Phys, Part 1 1995, V34, P700 HCAPLUS
- (9) Smith, R; J Appl Phys 1997, V81, P2699 HCAPLUS

L32 ANSWER 67 OF 82 HCAPLUS COPYRIGHT ACS on STN

AN 1998:207459 HCAPLUS
 DN 128:237612
 ED Entered STN: 11 Apr 1998
 TI Silicon bulk micromachining and nanomachining
 AU Esashi, Masayoshi; Minami, Kazuyuki; Ono, Takahito
 CS Faculty Engineering, Tohoku University, Sendai, 980, Japan
 SO Condensed Matter News (1998), 6(3-4), 31-44
 CODEN: CMAWE8; ISSN: 1056-7046
 PB Gordon & Breach Science Publishers
 DT Journal; General Review
 LA English
 CC 76-0 (Electric Phenomena)
 AB A review with 26 refs. on **advanced Si microsensors** for pressure, acceleration, angular rate, **IR radiation**, and atomic force developed based on bulk Si micromachining. Distortion-free, precise, or very small micro- to nanostructures enable extremely **sensitive** and quick response **sensors**. Packaged, capacitive, and integrated **sensors** were fabricated. Electrostatic force balancing **sensors** and resonant **sensors** performed wide dynamic range and high **sensitivity**, resp. Novel micromachining techniques developed and applied for the **sensors** are vacuum packaging, distortion-free anodic bonding, deep RIE, XeF2 Si etching, thickness monitoring during Si etching, Si **nanowire** growth by elec. field evaporation using UHV STM, etc. Microactuators like microvalves, optical scanners, and active catheters that moves flexibly in a blood vessel were developed.
 ST review silicon bulk micromachining nanomachining; **microsensor**
 silicon pressure acceleration radiation review; microdevice silicon
 fabrication review
 IT Micromachines
 Micromachining
Microsensors
 Semiconductor device fabrication
 (Si bulk micromachining and nanomachining for fabrication of
microsensors and micromachines)
 IT 7440-21-3, Silicon, properties
 RL: DEV (Device component use); PEP (Physical, engineering or chemical
 process); PRP (Properties); PROC (Process); USES (Uses)
 (Si bulk micromachining and nanomachining for fabrication of
microsensors and micromachines)

L19 ANSWER 4 OF 5 HCAPLUS COPYRIGHT ACS on STN

AN 1999:770746 HCAPLUS Full-text

DN 132:160229

ED Entered STN: 07 Dec 1999

TI Controlled Chemical Routes to Nanotube Architectures, Physics, and Devices

AU Dai, Hongjie; Kong, Jing; Zhou, Chongwu;

Franklin, Nathan; Tomblor, Thomas; Cassell, Alan; Fan, Shoushan;

Chapline, Michael

CS Department of Chemistry, Stanford University, Stanford, CA, 94305, USA

SO Journal of Physical Chemistry B (1999), 103(51), 11246-11255

CODEN: JPCBFK; ISSN: 1089-5647

PB American Chemical Society

DT Journal

LA English

CC 78-1 (Inorganic Chemicals and Reactions)

Section cross-reference(s): 76

AB This article presents the authors' recent work in the controlled synthesis of multiwalled (MWNT) and single-walled nanotubes (SWNT) with ordered architectures. The general synthesis approach involves CVD using rationally designed catalyst and substrates. The results include self-oriented MWNTs, individual SWNTs grown from controlled surface sites, and structures of suspended SWNTs along well-defined directions. The chemical derived nanotube architectures have opened up new possibilities in fundamental characterization and potential applications of nanotube materials. Systematic electron transport measurements are carried out to elucidate the elec. properties of various classes of SWNTs and to explore the physics in 1-dimensional systems. **High-performance elec. devices based on individual SWNTs are enabled** by combining synthesis and microfabrication approaches.

ST carbon nanotube SWNT MWNT prepn elec property

IT Nanotubes

RL: PEP (Physical, engineering or chemical process); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); PROC (Process)

(carbon; growth and electron transport properties of single-walled and multiwalled carbon nanotubes)

IT Electric conductivity

Electric current-potential relationship

Electric resistance

Electric transport properties

Field effect transistors

(growth and electron transport properties of single-walled and multiwalled carbon nanotubes)

IT 7440-44-0P, Carbon, preparation

RL: PEP (Physical, engineering or chemical process); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); PROC (Process)

(growth and electron transport properties of single-walled and multiwalled carbon nanotubes)

RE.CNT 68 THERE ARE 68 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Amelinckx, S; Science 1994, V265, P635 HCAPLUS

(2) Baker, R; Carbon 1989, V27, P315 HCAPLUS

(3) Baker, R; Symposium of the Materials Research Society 1994, V349, P251 HCAPLUS

(4) Bethune, D; Nature 1993, V363, P605 HCAPLUS

(5) Bockrath, M; Nature 1999, V397, P598 HCAPLUS

(6) Bockrath, M; Science 1997, V275, P1922 HCAPLUS

(7) Bonard, J; Appl Phys Lett 1998, V73, P918 HCAPLUS

(8) Cassell, A; J Am Chem Soc 1999, V121, P7975 HCAPLUS

(9) Cassell, A; J Phys Chem B 1999, V103, P6484 HCAPLUS

(10) Che, G; Nature 1998, V393, P346 HCAPLUS

(11) Chico, L; Phys Rev B 1996, V54, P2600 HCAPLUS

(12) Cobden, D; Phys Rev Lett 1998, V81, P681 HCAPLUS

(13) Collins, P; Appl Phys Lett 1996, V69, P1969

(14) Dai, H; Appl Phys Lett 1998, V73, P1508 HCAPLUS

(15) Dai, H; Nature 1996, V384, P147 HCAPLUS

(16) de Heer, W; Science 1995, V270, P1179 HCAPLUS

(17) Dekker, C; Phys Today 1999, V52, P22 HCAPLUS

(18) Dresselhaus, M; Science of Fullerenes and Carbon Nanotubes 1996, V1, P985

(19) Ebbesen, T; Phys Today 1996, V49, P26 HCAPLUS

(20) Endo, M; Chemtech 1988, P568 HCAPLUS